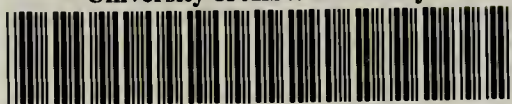


University of Alberta Library



0 1620 2405 0708

SC

BLUE JAY

Volume 65 Number 2

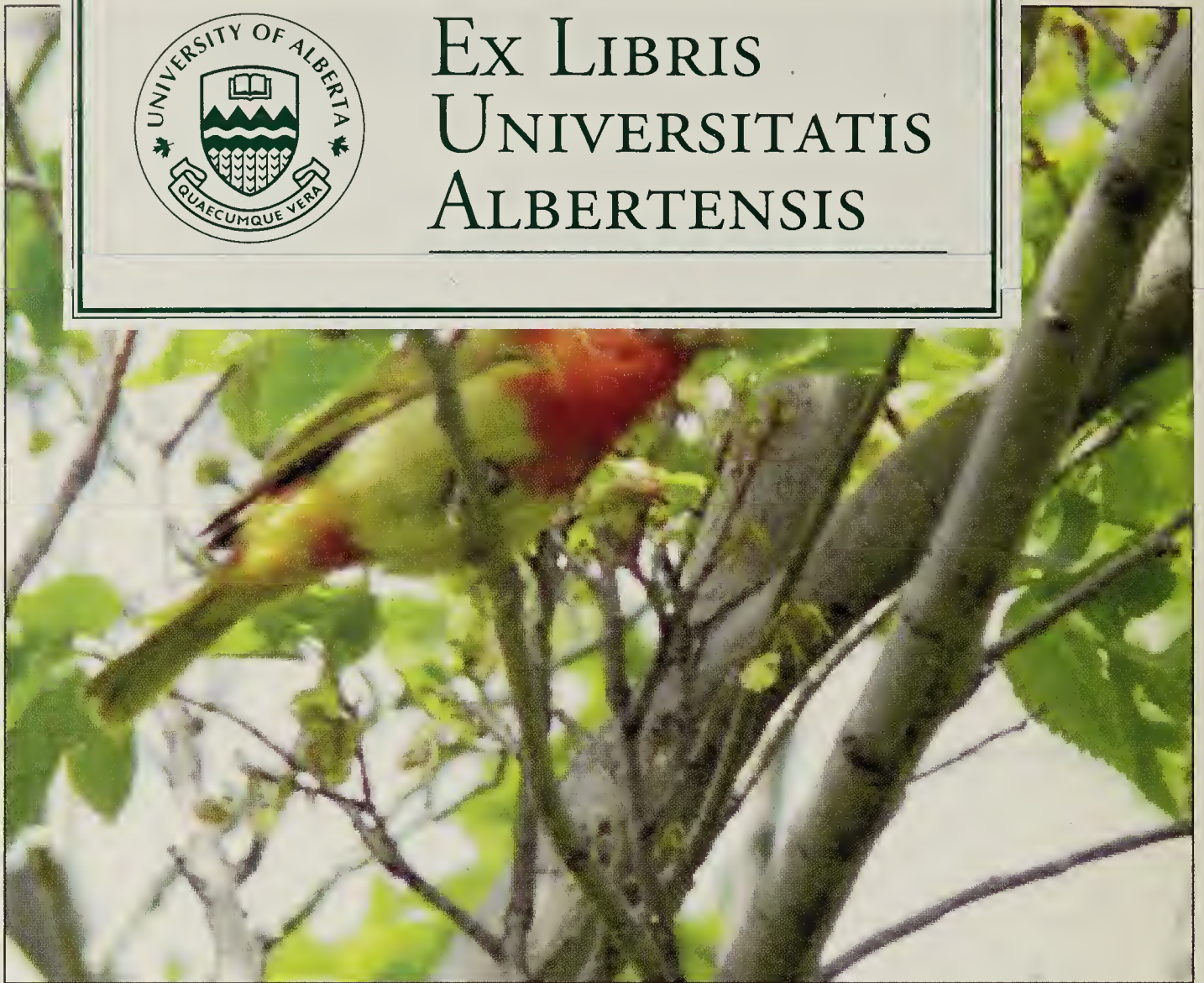
June 2007

QH
1
B65
v.65:
no.2
2007

SCI/TECH



EX LIBRIS
UNIVERSITATIS
ALBERTENSIS



Blue Jay

Vol. 65 No.2

June 2007

65-128

NATURE

FIELD SKETCHES: CLIFF SWALLOWS 96, 97; HARRIS'S SPARROW, WHITE CROWNED SPARROW 118

Birds

STATUS OF WADING BIRDS (ARDEIDS AND IBISES) AT THE NORTH END OF LAST MOUNTAIN LAKE IN 2006. *Ross D. Dickson, Alan R. Smith and Philip S. Taylor* 67

SWAINSON'S HAWKS GATHER TO FORAGE AT FIRES ON A NORTHERN PRAIRIE.

Robert K. Murphy and Karen A. Smith 78

Plants

FLORA OF NORTH AMERICA (FNA) SCHEDULED PUBLICATION OF VOLUMES INCLUDING SASKATCHEWAN VASCULAR PLANT FAMILIES.

Vernon L. Harms 82

SMALL WHITE LADY'S-SLIPPER, *Cypripedium candidum*, COLLECTED IN SASKATCHEWAN IN 1895. *Bernard de Vries* 86

Insects

RESULTS OF THE 2006 INTERNATIONAL BUTTERFLY COUNTS IN SASKATCHEWAN.

Mike Gollop and Anna Leighton 89

INTRODUCED LEAFY SPURGE HAWKMOTH, *Hyles euphorbiae* L., APPEARS IN SASKATOON. *Tyler J. Wist* 98

Aquatic Invertebrates

A PRELIMINARY CHECK LIST OF AQUATIC MACROINVERTEBRATES ASSOCIATED WITH MEADOW BANK LAKE IN VAN BRIENEN LAND NATURE SANCTUARY, SK.

Dale Parker 102

Notes and Letters

FIRST RECORD OF A TRICOLORED HERON FOR SASKATCHEWAN.

Philip S. Taylor and John Dunlop 111

HIGHLIGHTS OF A SOUTHERN SASKATCHEWAN NEST TOUR IN JUNE.

Dan Zazelenchuk 112

WHITE-TAILED KITE NEAR MAPLE CREEK, SK. *Candace Savage* 114

HIGHEST SWAINSON'S HAWK NEST RECORDED IN SASKATCHEWAN.

André Gérard 115

A VISIT TO THE SWAN FAMILY. *George Tosh* 116

Poetry

OVERCAST. *David Raju* 119

UNEXPECTED FINDS. *Bob Nero* 119

NATURE. *Victor C. Friesen* 120

GARDEN COMPANION. *Jean Mackenzie* 120

SHADOW OF MONARCH. *Bob Nero* 121

NOT GOOD ENOUGH. *Jean MacKenzie* 121

Nature Library

MARSHES: THE DISAPPEARING EDENS. *William Burt* 122

LADYBUGS OF ALBERTA. *Jason J. Dombroskie* 123

Mystery Photo 125

Front cover: Bloodroot, *Sanguinaria canadensis*, an early spring wild flower of the poppy family, named for the orange-red juices in its stem, grows in rich woods. Photographed in the Assiniboine Valley in south central Manitoba, the western edge of its range in Canada, by Ardythe McMaster, May 7, 2007

Back cover: Northern Blue males, 26 June 2006, on Silica Sand Road, east of Hudson Bay, SK. Photograph by John Kozial

Inside front cover:
top: Summer Tanager at Pleasant Point Churchyard cemetery, south of Clavet, SK, and 2 miles north of Blackstrap North Dam, 31 May 2007 Lou Baudru
bottom: Male Common Green Darner, 21 August 2006, Pasquia Hills, SK John Kozial

Inside back cover:
top: Figure 2. Larva of Leafy Spurge Hawkmoth Tyler Wist
bottom: Figure 3. Adult Leafy Spurge Hawkmoth and pupal casing. Tyler Wist



Meadow Lark Randy McCulloch

THIS ORGANIZATION RECEIVES FUNDING FROM:



STATUS OF WADING BIRDS (ARDEIDS AND IBISES) AT THE NORTH END OF LAST MOUNTAIN LAKE IN 2006

ROSS D. DICKSON, Canadian Wildlife Service, PO Box 280, Simpson SK S0G 4M0, ALAN R. SMITH and PHILIP S. TAYLOR, Canadian Wildlife Service, 115 Perimeter Road, Saskatoon SK S7N 0X4.

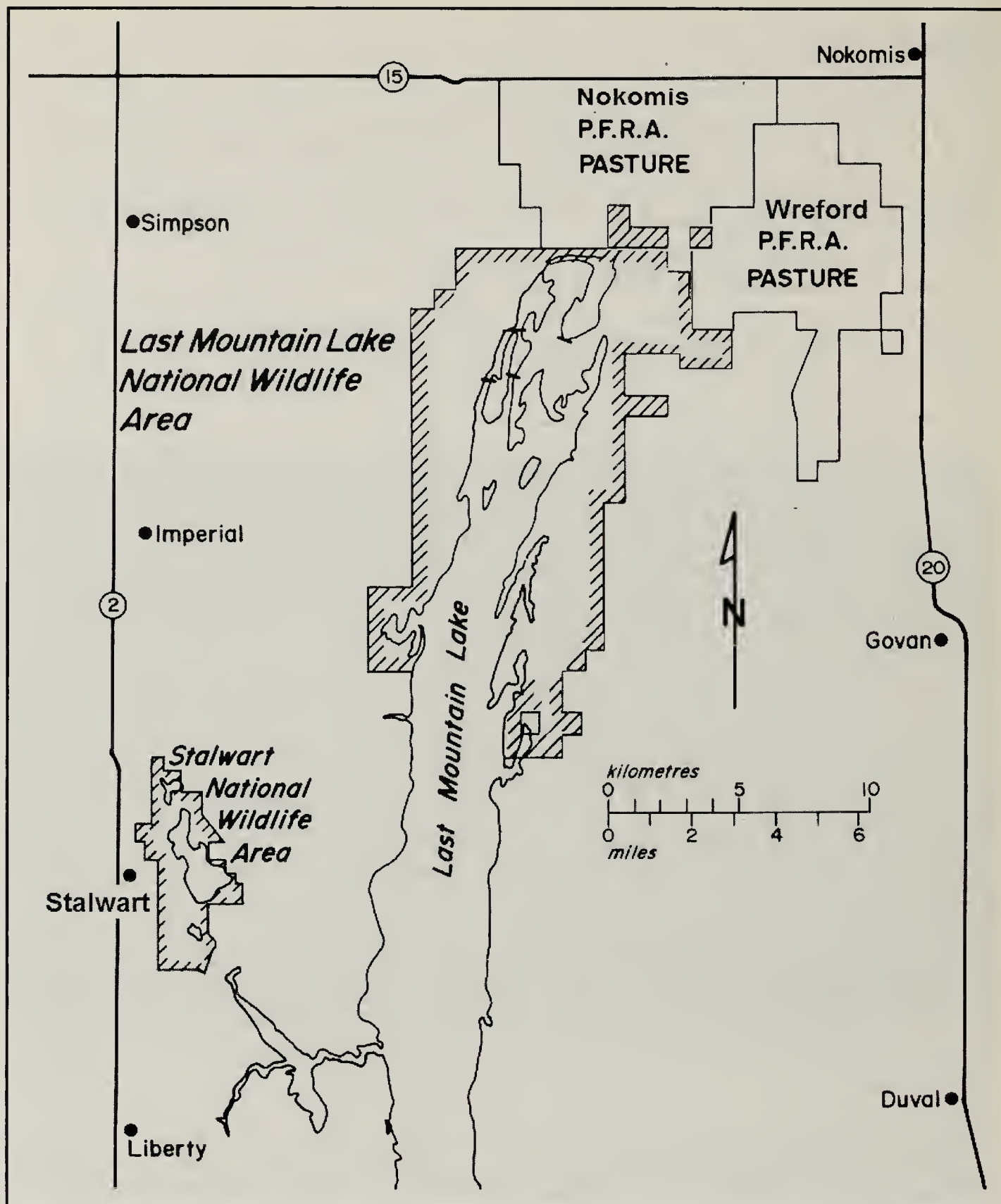


Figure 1. Cattle Egrets at the Borsheim project beside Highway 15 on 27 August 2006
V. Kjoss

The north end of Last Mountain Lake and surrounding wetlands may be one of the best areas in Saskatchewan to look for uncommon wading bird species, but the variety seen during the autumn of 2006 was extraordinary. Seven heron species: American Bittern, Great Blue Heron, Great Egret, Snowy Egret, Little Blue Heron, Cattle Egret and Black-crowned Night-Heron as well as the related White-faced Ibis were reported, some in unprecedented numbers. The only species previously reported for the area but not seen in 2006 is Tricolored Heron. This paper presents current information for wading

bird species at the Last Mountain Lake National Wildlife Area (LMLNWA), supplemented by data from the nearby Stalwart NWA (Map 1.) Information on the Tricolored Heron is given in a separate note in this issue on page 111.

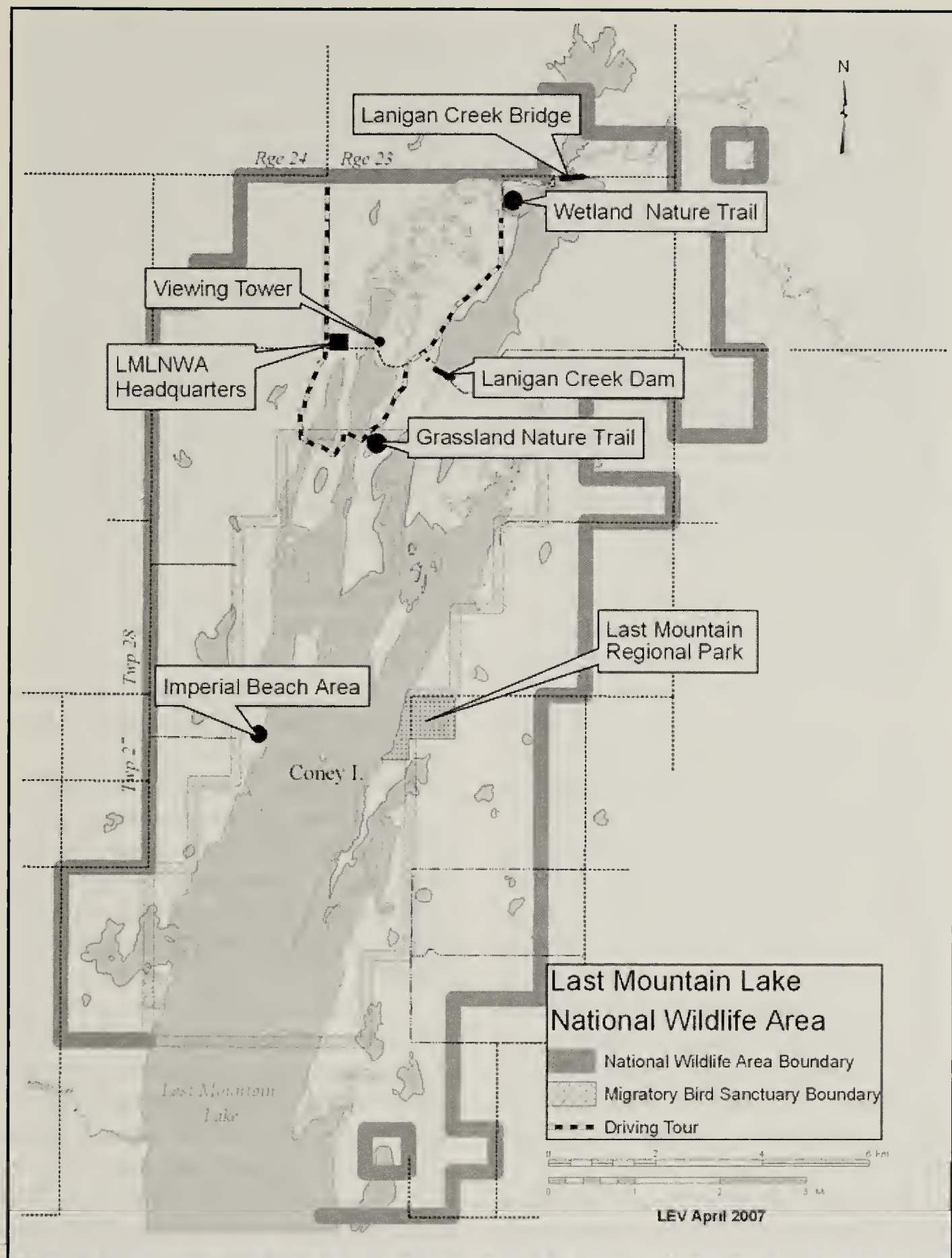
Species information was compiled mainly from Canadian Wildlife Service notebooks or reports, with additional data from graduate student reports and observations by visiting birders. Frequently cited observers are listed by their initials (ARS = Alan R. Smith, PST = Philip S. Taylor, RDD = Ross D. Dickson, WCH = Wayne C. Harris).



Map 1. The north end of Last Mountain Lake

Sightings of uncommon waders have been recorded in NWA annual reports since 1968. The status of all bird species was published in 1987.⁵ Some historical information about the presence of waders (or lack thereof) at the north end of the lake, often within the Migratory Bird Sanctuary (MBS, shown in Map 2), came from reports of expeditions sponsored by various museums, or from banding data.

For this paper, abundance and breeding status were taken from the 1995 bird checklist for both NWAs.⁹ An asterisk following the species name indicates historical breeding records. Common species are usually present from late April to late October, depending on ice cover. If autumn temperatures are above the long-term average, as in 1983, some individuals may linger into November.



Map 2. Last Mountain Lake National Wildlife Area and Migratory Bird Sanctuary.

American Bittern *Botaurus lentiginosus* *

Common resident. Low-lying areas at the north end of LMLNWA were inundated by record high floodwaters in mid-April 2006. This created new habitat near the Driving Tour trails (Map 2) from which at least eight bitterns

could be heard during early evening on 24 April (RDD). Following a prescribed burn of native grassland on a large peninsula nearby, an early May 2006 survey downstream of the Lanigan Creek Dam found one bittern per 500 m of shoreline (PST). In 2006, bitterns were noted from 24 April to 23 October.

A late record was three birds on 12 November 1983 (WCH).

Wetland habitat loss is the major threat to American Bitterns across North America.¹¹ Large marshes at Last Mountain Lake and Stalwart NWAs, however, are protected areas. Furthermore, the combination of changing water levels and patches of dense emergent vegetation produces ideal habitat for American Bittern. Its status at these NWAs has remained unchanged for the past 30 years.

Great Blue Heron *Ardea herodias*

Uncommon resident. Birders commented frequently during the autumn of 2006 on large numbers of Great Blue Herons. These herons were probably migrating birds and their high numbers may have been related to unusually high water levels in NWA marshy areas and dugouts. An informal survey of LMLNWA marsh shoreline in late September 2006 averaged one Great Blue Heron for every 0.8 km (RDD). This species is limited by food supply in most of its range, so adults are often territorial and well-separated in feeding areas.³ More than 30 years ago, the highest one-day count (43) occurred on 4 September 1973 for this heron which was then considered by observer Wayne Harris as a common migrant during early autumn. The Great Blue Heron is usually the first wader to arrive in spring. Reports in 2006 were from 10 April to 28 October. A late record was two birds 12 November 1983 (WCH).

Although listed as a resident, this species has had no recent verified NWA records of successful breeding, perhaps due in part to scarcity of appropriate nesting habitat. This species often nests in colonies on treed islands or other isolated areas. Young herons were banded by Fred

Bard at "Imperial Beach area" (at a location believed to be within the current NWA boundaries) in 1936 and 1938 (Royal Saskatchewan Museum data). In late April 2005 and 2006, herons occupied up to six stick nests in trees on Coney Island west of Last Mountain Regional Park, but there were no summer visits to verify whether young were produced.

Great Egret *Ardea alba*

Occasional spring and summer visitor. (Figure 2) Frequent sightings of one or two birds near LMLNWA headquarters began in late May 2006 and continued sporadically into early autumn (many observers). Participants of a bird banding workshop watched seven Great Egrets fly to a bulrush (*Scirpus* spp.) roost southeast of the Grassland Nature Trail at sunset on 23 September. This is the highest number of Great Egrets recorded at one Saskatchewan location. Thereafter, numbers observed varied from three to six birds and the location of the nightly roost changed slightly within the Migratory Bird Sanctuary (ARS). The last sighting was of four on 8 October 2006 (RDD).

Previous Great Egret records at LMLNWA are of one or two birds, sometimes staying for a few weeks. The first record was on 11 May 1975 (WCH). Great Egrets were recorded in six separate years of the 1980s, and then not again until 2000, 2002 and 2005 (many observers). This long absence may indicate a low level of birding, although this species has a history of invading, then abruptly vacating, parts of its breeding range.¹⁷

This cosmopolitan species usually nests in colonies in trees or tall shrubs.¹⁷ Suitable nesting habitat appears to be limited within the NWAs. The duration of sightings in 2006 is



Figure 2. Great Egret and American White Pelicans, 14 May, 2006

V. Kjoss

intriguing as no nest was found. There are only two breeding records for Saskatchewan: east of Craven in the Qu'Appelle Valley in 1955 and Middle Quill Lakes in 1976.²³

Snowy Egret *Egretta thula*

Occasional spring, summer or autumn visitor. A single bird, probably an adult, was seen feeding near a flock of Cattle Egrets on 28 August 2006 at the Ducks Unlimited Borsheim habitat enhancement project beside Highway 15, about six kilometres north of LMLNWA (L. Strauss). A second 2006 sighting (possibly the same bird) was on 29 August in LMLNWA at Lanigan Creek Dam on the Driving Tour (ARS).

The first record of a Snowy Egret at LMLNWA was of a single bird on 17 July 1972 (J. Hatfield). Five records from the 1980s, two from the 1990s, and one in 2001 were each of one or two birds on single dates or for short durations (many observers). Four of the records were at Lanigan Creek Dam.

Little Blue Heron *Egretta caerulea*

Accidental (out of its usual range) – summer. One adult (“small heron, all dark blue with pale patch at base of

bill”) was seen in flight near the Wetland Nature Trail on 9 September 2006 (A. Leighton, T. Leighton, B. Dewinter, D. Dewinter).

There were no further sightings until 3 October when one flew to a roost south of the Grassland Nature Trail (ARS). In good light conditions near sunset on 4 October one apparent adult circled repeatedly before landing at a bulrush roost shared with five Great Egrets and four Cattle Egrets (ARS, PST, RDD). The last known record was at the same roost in the MBS on 5 October (ARS). All sightings are assumed to be of the same bird. There are no photographs. The 2006 sightings represent the first Saskatchewan confirmed records since 1993.

This is only the second record for LMLNWA. An adult was identified at the dam on Lanigan Creek on 19-20 June 1976.¹³

Cattle Egret *Bubulcus ibis*

Accidental - spring and summer. Sightings in 2006 occurred over a five month period. An adult Cattle Egret was seen in a Highway 15 roadside ditch



Figure 3. Cattle Egret on the back of a cow, 18 October 2006

R. Dickson

about six km north of LMLNWA in May 2006 (PST). A few adult birds were seen periodically during the summer flying within the MBS, but no search was made for nests. Beginning in early August 2006, a growing flock of adults was found associating with a cattle herd near the Highway 15 location. The highest number counted in this flock was 38 on 25 August, of which eight were believed to be recent fledglings characterized by a dark bill (RDD). (See September 2006 Blue Jay cover photo for a close look at a large dark-billed chick.) This is the largest group of Cattle Egrets reported at one Saskatchewan location. In the following days, other observers who did not get an exact count estimated this flock to have over 40 Cattle Egrets.

This flock rested occasionally during daylight hours at the Borsheim project. (Figure 1) The flock size fluctuated daily because some birds used alternate feeding locations. Each day, singles or small flocks flew along the marsh edges, sometimes joining one of the several cattle herds within the LMLNWA for periods of a few minutes to several

hours. No attempt was made to determine the local diet of Cattle Egrets in late summer, although most foraging occurred beside grazing animals.

As overnight temperatures dropped, so too did the flock size but at least 13 Cattle Egrets shared a bulrush roost with seven Great Egrets on 23 September. That roost was last used on 8 October by 3 Cattle Egrets (RDD).

The remaining egrets then changed their allegiance to a herd of ten cows grazing near the LMLNWA headquarters. They walked among or rode on the cattle (Figure 3) and apparently stayed with them at night in a sheltered corral rather than flying to the bulrush roost. Overnight temperatures by then frequently dipped to about -8°C and there were periodic snowfalls. It is doubtful the birds were finding any food at this time. By 18 October the egrets spent more time riding than walking with snow on the ground. Two lethargic egrets (one with a black bill and one with a yellow bill) were last seen alive on 19 October, standing on a lawn at the headquarters.

A freshly dead egret was found on the morning of 20 October, about 200 m southeast of headquarters. This specimen was donated to the Royal Saskatchewan Museum. It had a completely yellow bill and blackish legs, which indicates that it was likely a non-breeding adult.²⁴ A necropsy is needed to verify its age and sex. The wing chord, tarsus length and culmen length (237 mm, 78mm and 53 mm, respectively) are within the normal size range of an adult measurement for the Texas population.²⁴ It is possible that it died of starvation and/or hypothermia. North American (Florida) adults range from 270-512 g; this bird weighed only 258 g.²⁴

The Cattle Egret is well known for its juvenile dispersal after the breeding season.²⁴ Occasionally, one of these egrets with a dark bill seen in late autumn may be misidentified as a Snowy Egret, but that species at any age has yellow feet. A recently-fledged young Cattle Egret may have a dark bill but its legs and tops of its toes will be a very dark (blackish) green; only the soles are yellowish. Any small white egret seen alive in October in Saskatchewan is likely to be a Cattle Egret, as the latest record for Snowy Egret is in early September (ARS).

The Cattle Egret in North America has an unusual nesting schedule, perhaps related to its probable African origin. The breeding season is prolonged (April-September) in the central flyway that includes Saskatchewan and Manitoba.²⁴ Early summer surveys such as the Breeding Bird Survey that are satisfactory for most New World species may not detect any breeding evidence; chicks in nests at various stages of development were seen on 1 September 2005 in Manitoba.¹ Only adults in breeding plumage were noted at Last Mountain Lake prior to mid-August.

If nesting occurred locally in 2006, the location of the colony is unknown. The only roost found was at a small bulrush stand within the MBS. In 2005, Cattle Egrets at Stalwart NWA roosted at night at their nest site, a common behaviour for this species.

In 2005, Cattle Egret nests with eggs were photographed (PST, K. Hecker) and fledglings were seen at a breeding colony shared with Black-crowned Night-Herons at Stalwart NWA. The peak number was 35 or 36 birds on 19 September with the last record of one bird of unknown age on 8 October (ARS, RDD). The bulrush stand in which the birds had nested in 2005 was flooded in 2006 and only two adult birds were seen at Stalwart NWA on 31 May (PST). No breeding activity was subsequently noted.

A late record of one apparently healthy dark-billed Cattle Egret on 18 October 2005, six kilometers north of LMLNWA was not regarded as noteworthy at the time. However, the first sighting of 2006 and the association with the cattle herd in late summer were at the same location. There is some indication that most Cattle Egrets disperse and establish residence while juveniles.²⁴

Successful breeding has not been confirmed within LMLNWA boundaries although three or four adults were on an island northwest of Last Mountain Regional Park during the first week of June 1996 (PST, M. Tataryn). Numerous reports during the summer of up to four egrets in the Wreford PFRA pasture (Map 1) from late June to late July (M. Gee & G. Thompson) preceded sightings of six egrets near LMLNWA headquarters in late July and of a flock in a field on the west side of the lake in mid-August 1996 (D. Nieman, C. Swoboda). The largest number (15)

reported in that field, about two kilometres from the island visited in June, included two immature birds with black bills on 27 August 1996 (D. Nernberg, M. Tataryn). This supports the theory that Cattle Egrets likely nested on the island in 1996.

The dynamic range expansion of this species throughout the Americas since 1877 has been well documented.²⁴ The first Cattle Egret reached Saskatchewan in 1974 and the species was first seen at the north end of Last Mountain Lake on 26 May 1984.^{12,14} This egret is now reported in Saskatchewan almost annually but there are only two published breeding records.^{20,21}

Black-crowned Night-Heron

Nycticorax nycticorax *

Common resident. No estimate of their numbers is known for 2006, but sightings extended from early May until October 30. The latest reported date is on 12 November 1983 (WCH). An extremely early arrival date occurred on 29 March 2007. (L. Vanthuyne, RDD).

Night-herons may be found by patient birders along LMLNWA Driving Tour road where they appear to be fishing for ninespine stickleback (*Pungitius pungitius*) at the outlets of water control structures, or roosting in bulrush. They nest in colonies at both NWAs; 283 nests were counted 13 July 1984 at Stalwart NWA (D. Nernberg, M. Krystal).

The highest one-day count at Last Mountain Lake NWA is 72 adults on 27 May 1987 (WCH). The first NWA record was from 1930 (F. Bard). A rapid range expansion westward through southern Saskatchewan into Alberta began in the mid-1960s. Considered uncommon at LMLNWA as recently as 1977,⁸ this species is often under-reported

because it hides if disturbed.⁶

White-faced Ibis *Plegadis chihi*

Occasional - spring and summer. In 2006, several ibis were seen irregularly in LMLNWA within 70m of the Lanigan Creek bridge, beginning with a single bird on 1 September (R. Wapple). The largest flock (nine) was seen on 13 September (ARS, L. Parker), although most reports were of two or three birds (M. Yorke, M. Reid, others). After this area flooded following a rain event, some were found feeding beside the Wetland Nature Trail. The last record is of one ibis on 11 October (RDD). All local ibis records are assumed to be of White-faced Ibis as there are no confirmed records of Glossy Ibis for Saskatchewan. These species can be separated only when in adult plumage.¹⁶

The first Saskatchewan record was one bird in 1976 east of Stalwart NWA.¹⁵ Three ibis seen on 15 May 1977 represent the first record for LMLNWA.⁴ LMLNWA sightings of one or two ibis are documented from April to October, sometimes for up to 4 weeks in duration; records exist for 1985, 1986, 1987, 1990, 1994, 1996 (many observers). A single bird was seen in a field bordering LMLNWA on 23 April 2003 (L. Vanthuyne, J. Dunlop).

There are no verified nesting records at either NWA although the bulrush stands appear to be suitable habitat. Ibis were seen occasionally from 8 June to 24 July 1996 east of LMLNWA headquarters, and once appeared to be carrying nesting material (PST, M. Tataryn). A nest search attempted on 23 July 1996 located a pair of adults within a night-heron colony but no nest, eggs or young were found (PST, J. Dunlop).

It is likely that ibis have been under-

reported at both NWAs. Shallow flooded wetlands or mudflats are favoured for feeding; these are often hidden from view by tall emergent vegetation.² A pair of adults and one young at Old Wives Lake in July 2000 represent the only known breeding record for Saskatchewan.²

Discussion

Abundance and breeding status have changed for two wading bird species since the compilation of the 1995 NWA bird checklist. Great Blue Heron is now an uncommon breeding resident. Cattle Egret is an occasional breeding visitor. The status of the six other species discussed in this paper remains unchanged.

Will the number and variety of herons and ibis reported in 2006 occur again soon? Comparison of previous NWA checklists reveals a gradually increasing abundance for Great Blue Heron, Great Egret, Cattle Egret and White-faced Ibis.^{5,8,9} Southern ardeid species (Great Egret, Snowy Egret, Little Blue Heron, and Cattle Egret) and the ibis were unreported at the north end of Last Mountain Lake before the 1970s. Sightings also have increased following acquisition of land for LMLNWA, and construction of roads and impoundment berms that allowed birders better access to the marshes.

Managed water levels at Last Mountain Lake and Stalwart NWAs provide diverse marsh feeding habitat suitable for several wader species. Shallow flooded areas are especially productive for prey species such as crustaceans, amphibians and small fish, and serve as feeding areas for locally rare waders such as Little Blue Heron, Tricolored Heron, Snowy Egret and White-faced Ibis, as well as for bitterns and night-herons.^{10,11,18,19,22} The Great Blue Heron patrols the deepest

water, often up to its belly.³ The Great Egret is considered a feeding habitat generalist.¹⁷ Extensive bulrush stands are potential nest sites for bitterns, night-herons and ibis.

Southern heron species that prefer to nest or roost in tree colonies appear to be limited by lack of suitable habitat within the NWAs. However, fire suppression has allowed aspen bluffs to develop in the nearby agricultural landscape. Some of these bluffs, as well as trees or shrubbery in shelterbelts within a short flying distance of the NWAs, may with time be large enough to attract more nesting attempts by Great Blue Herons. Great, Snowy and Cattle egrets, and the Little Blue Heron all colonize areas with tall shrubs or appropriate trees. The present combination of nearby cattle herds and existing night-heron colonies in dense emergent vegetation appears to be attractive to breeding Cattle Egrets.

All nesting ardeids and ibis are intolerant of disturbance, which sometimes comes from non-human sources. Competition for any suitable nesting trees at Last Mountain Lake by a rapidly increasing population of Double-crested Cormorants may occur eventually, although current cormorant colonies within LMLNWA are on treeless islands. At many inland sites, beaver ponds that flood woodlands kill the mature trees that would attract nesting Great Blue Herons.

Additional wader species are anticipated at the NWAs. Three uncommon ardeids recorded elsewhere in southern Saskatchewan are at the current northern limits of their respective ranges. Green Heron, which typically prefers dense thickets, has been reported at the Valeport Marsh.^{7,23} Yellow-crowned Night-Heron prefers

crayfish elsewhere in its range; this prey is abundant along the shores of Last Mountain Lake.²⁵ The tiny Least Bittern, although unrecorded in Saskatchewan in more than 70 years, breeds south of Winnipeg and has been reported across Manitoba.¹⁶ Two additional ibis species (Glossy Ibis and White Ibis) have also been found in Manitoba wetlands.¹⁶ Permanent water at Last Mountain Lake and many years of data collection may permit it to be a baseline site to monitor changes in the abundance and range of wader species.

Increased knowledge of local roosting and breeding behaviour, in addition to observations by visiting birders, may result in much information being added in future years. Birders are encouraged to submit additional information on these or other bird species at any National Wildlife Area to the Area Manager at Last Mountain Lake NWA.

Acknowledgements

We are grateful to Gary Anweiler, Brenda Dale and Mark Tataryn for collecting and compiling bird records used in NWA checklists, and to John Hatfield, Clint Jorgenson, John Dunlop and Kerry Hecker for their wildlife observation summaries. We thank the many individuals who shared their bird sightings at the Last Mountain Lake and Stalwart National Wildlife Areas with the Canadian Wildlife Service. Helpful comments from an anonymous reviewer greatly improved the manuscript.

1. BAZIN, R. 2006. First documented breeding records of Cattle Egrets in Manitoba. *Blue Jay* 64(3):126-130.

2. BAZIN, R. and C. ARTUSO. 2006. First documented breeding record of White-faced Ibis in Manitoba. *Blue Jay* 64(2):64-68.

3. BUTLER, R. W. 1992. Great Blue Heron. In: *The Birds of North America*, No. 25 (A. Poole, P. Stettenheim, and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington, DC

4. CALLIN, E.M. 1978. White-faced Ibis at Last Mountain Lake, Saskatchewan. *Blue Jay* 36:123.

5. DALE, B. 1987. The birds of Last Mountain Lake and Stalwart National Wildlife Areas, Saskatchewan. *Blue Jay* 45(4):246-260.

6. DAVIS, W. E., Jr. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*). In: *The Birds of North America*, No. 74 (A. Poole and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington, DC

7. DAVIS, W. E., Jr., and J. A. KUSHLAN. 1994. Green Heron (*Butorides virescens*). In: *The Birds of North America*, No. 129 (A. Poole and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington, DC

8. ENVIRONMENT CANADA CANADIAN WILDLIFE SERVICE. 1977. Bird checklist: Last Mountain Lake Wildlife Management Unit.

9. ENVIRONMENT CANADA CANADIAN WILDLIFE SERVICE. 1995. Last Mountain Lake and Stalwart National Wildlife Areas bird checklist – fourth edition (1995).

10. FREDERICK, P. C. 1997. Tricolored Heron (*Egretta tricolor*). In: *The Birds of North America*, No. 306 (A. Poole and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington, DC

11. GIBBS, J. P. , S. MELVIN, and F. A. REID. 1992. American Bittern. In: *The Birds of North America*, No. 18 (A. Poole, P. Stettenheim, and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington, DC

12. GOLLOP, J. B. 1984. Prairie Provinces Region. *American Birds* 38:925-927.

13. HARRIS, W. C. and S. M. LAMONT. 1977. Little Blue Heron in Saskatchewan. *Blue Jay* 35:90.

14. HOUSTON, C. S and M. I. HOUSTON. 1974. Northern Great Plains (1 June-31 July 1974). *American Birds* 28:915-918.

15. LAHRMAN, F. W. 1976. White-faced Ibis in Saskatchewan. *Blue Jay* 34:328.

16. MANITOBA AVIAN RESEARCH COMMITTEE. 2003. The Birds of Manitoba. Manitoba Naturalists Society, Winnipeg.
17. McCRIMMON, D. A., Jr., J. C. OGDEN, and G. T. BANCROFT. 2001. Great Egret (*Ardea alba*). In: The Birds of North America, No. 570 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
18. PARSONS, K. C., and T. L. MASTER. 2000. Snowy Egret (*Egretta thula*). In: The Birds of North America, No. 489 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
19. RODGERS, J. A., Jr., and H. T. SMITH. 1995. Little Blue Heron (*Egretta caerulea*). In: The Birds of North America, No. 145 (A. Poole and F. Gill, eds.). Academy of Natural Sciences, Philadelphia: and American Ornithologists' Union, Washington, DC
20. RONEY, K. 1982. Cattle Egret nesting record for Saskatchewan. *Blue Jay* 40:163-164.
21. ROY, J.F. 1996. Cattle Egret. In Birds of the Elbow. Special publication: no. 21, Saskatchewan Natural History Society, Regina.
22. RYDER, R. A. and D. E. MANRY. 1994. White-faced Ibis (*Plegadis chihi*). In: The Birds of North America, No. 130 (A. Poole and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington, DC
23. SMITH, A. R. 1996. Atlas of Saskatchewan birds. Special publication No. 22, Saskatchewan Natural History Society, Regina.
24. TELFAIR, R. C. II. 2006. Cattle Egret (*Bubulcus ibis*). In: The Birds of North America Online, No. 113 (A. Poole, ed.). Cornell Laboratory of Ornithology, Ithaca, New York.
25. WATTS, B. D. 1995. Yellow-crowned Night-Heron (*Nyctanassa violacea*). In: The Birds of North America, No. 161 (A. Poole and F. Gill, eds.). Academy of Natural Sciences, Philadelphia and American Ornithologists' Union, Washington.



White-winged Crossbill after a bath in a water fountain in Swift Current.

Norris Currie

SWAINSON'S HAWKS GATHER TO FORAGE AT FIRES ON A NORTHERN PRAIRIE

ROBERT K. MURPHY, Department of Biology, University of Nebraska at Kearney, Kearney, NE 68849, E-mail: <murphyrk@unk.edu>, and KAREN A. SMITH, U.S. Fish and Wildlife Service (retired), Lostwood National Wildlife Refuge, Kenmare, ND 58746, E-mail: <prairie@restel.net>

Swainson's Hawks characteristically soar over farm machinery during summer, searching for rodents and other prey that are exposed by disturbance to vegetation during cultivation, mowing, crop harvest and pesticide application.^{3,11} Estep suggests that this hawk also may forage in association with burning activities.⁴ During a 20-year period, 1983-2002, we observed Swainson's Hawks and other species of hawks foraging at 158 prescribed burns conducted by us and co-workers to

restore and maintain native, northern mixed-grass prairie at the 109-km² Lostwood National Wildlife Refuge (NWR) in northwest North Dakota (48° 37' N, 102° 27' W). Our observations suggest that this hawk is attracted to smoke plumes and that fire may be an important part of its evolutionary ecology.

Methods

Prescribed burns were conducted during spring (late-April through mid-May) or summer (mid-July through



Figure 1. A prescribed burn on the 2250-ha Wilderness Area at Lostwood National Wildlife Refuge in nw North Dakota is large enough to create its own weather.

R. Murphy



Figure 2. A Swainson's Hawk soars near a fire.

R. Murphy

early-September) and typically covered 65-400 ha, although as many as 2250 ha were burned in a day (Figure 1). Burns were conducted by a surround-fire approach: igniting a backing fire along the downwind side, backfiring along flanks, then setting a headfire downwind into the center of the area. Prescribed burns consumed 80-95% of above-ground vegetation, even when much green growth was present (e.g., in mid-May).

We ignited fires while afoot rather than from motorized vehicles, improving our opportunity to see and hear wildlife. Although we could not systematically survey hawks because we were helping conduct burns, we carried binoculars and noted approximate numbers of each species of hawk within burn areas. Hawks conspicuously soared and were readily counted at small burns (65-130 ha), but some likely were overlooked at large burns (400-2250 ha) where smoke often hindered visibility over much of the area.

Results

We observed Swainson's Hawks at every spring and summer burn (Figure

2). Typically, three to five Swainson's Hawks attended and foraged at a burn. One or two Red-tailed Hawks soared over most prescribed burns that were conducted in spring. Based on their behavior, especially territorial screaming, the Red-tailed Hawks usually appeared to be defending nest sites from people conducting the burns, rather than actively foraging. Swainson's Hawks were at least two to three times more common than Red-tailed Hawks at prescribed burns in spring, even though nesting Red-tailed Hawks were three to five times more common than nesting Swainson's Hawks in the Lostwood NWR area (Swainson's Hawks, 3-7 pairs/100 km² versus Red-tailed Hawks, 15-21 nesting pairs/100 km²).¹⁰ We seldom observed Ferruginous Hawks, but the species was very uncommon in the area (about 1 nesting pair/100 km²).¹⁰

Swainson's Hawks were most numerous at burns conducted in spring as compared to burns later in the season. For example, we observed at least 13 Swainson's Hawks along with three Red-tailed Hawks and one Ferruginous Hawk foraging at a 323-ha burn conducted May 15, 1989.

Based on the known nesting distribution of hawks in the Lostwood area¹⁰, we believe that some Swainson's Hawks traveled at least 10-15 km from their nesting territories to forage at this and other burns conducted after early May.

On a 46-ha burn on May 9, 1993, we observed at least 28 Swainson's Hawks plus two Red-tailed Hawks foraging on voles (*Microtus* spp.) and mice (probably Deer Mice, *Peromyscus maniculatus*). Near sunset, about 3 hr after the burn, Swainson's Hawks were scattered over the blackened prairie, perched on the ground with their crops bulging. Some still were making short hop-flights after prey. At least five Swainson's Hawks continued to forage on the burn daily over the following 3 days. Because the timing of this burn coincided with the later migration period of Swainson's Hawks in the area that year, we surmised that most of the Swainson's Hawks had been migrating and were attracted to the burn by its smoke plume. On May 7, 2001 we burned 30 ha about 2 km north of the refuge. Seven Swainson's Hawks foraged simultaneously over the relatively small burn, appearing oblivious to each other and to us as we walked about the burn area.

The Swainson's Hawks we observed often used strong updrafts created by heat from the fires to rise rapidly to 50-100 m above ground after missing an attempt at prey. We often noted several Swainson's Hawks soaring close together (25-50 m apart) over a headfire or flank fire. Commonly, Swainson's Hawks flew less than 6 m above ground over the burned prairie, flapping and gliding much like a Northern Harrier. Late in the day, it was typical to see the hawks perched on the ground with distended crops, hop-flying or running short distances after

rodents, similar to when foraging on grasshoppers.⁷

Discussion

Swainson's Hawks are part of the unique community of birds that evolved, at least in part, in the temporally and spatially dynamic environment that characterized the presettlement northern Great Plains.⁸ Fire and bison grazing were frequent, widespread disturbances that reduced vegetation swiftly and dramatically,^{1,2,6} presumably making small animals vulnerable to highly mobile, wide-ranging predators including the Swainson's Hawk. The species appears to recognize smoke plumes as cues to foraging sites and may travel far to such sites, not unlike the White-tailed Hawk.⁹ In much of the contemporary northern Great Plains, the Swainson's Hawk nests in landscapes dominated by agriculture,^{5,12} where frequent disturbance by bison herds and prairie fires largely have been replaced by disturbance associated with farm machinery. Fire-caused disturbance to vegetation may be an important aspect of the evolutionary ecology of Swainson's Hawk and, as such, may help facilitate the species' modest ability to adopt an agricultural environment as breeding habitat.

1. BRAGG, T.B. 1995. The physical environment of Great Plains grasslands. In: A. Joern and K.A. Keeler (eds.), *The Changing Prairie: North American Grasslands*. Oxford University Press, New York. p. 49-81.

2. CAMPBELL, C., I.D. CAMPBELL, C.B. BLYTH, and J.H. MCANDREWS. 1994. Bison extirpation may have caused aspen expansion in western Canada. *Ecography* 17:360-362.

3. ENGLAND, A.S., M.J. BECHARD, and C.S. HOUSTON. 1997. Swainson's Hawk *Buteo swainsoni*. *The Birds of North America*. No. 265. F.B. Gill and A. Poole (eds.). Academy of Natural Sciences, Philadelphia, Pennsylvania and American Ornithologists' Union, Washington, D.C.

4. ESTEP, J.A. 1989. Biology, movements, and habitat relationships of the Swainson's Hawk in the Central Valley of California, 1986-87. California Department of Fish and Game, Nongame Bird and Mammal Report.
5. GROSKORTH, L.C. 1995. Nest-site selection by the Swainson's Hawk on the Regina plain, Saskatchewan. *Canadian Journal of Zoology* 73:1887-1890.
6. HIGGINS, K.F. 1986. Interpretation and compendium of historical fire accounts in the northern Great Plains. U.S. Fish and Wildlife Service, Resource Publication No. 161.
7. JOHNSON, C.G., L.A. NICKERSON, and M.J. BECHARD. 1987. Grasshopper consumption and summer flocks of nonbreeding Swainson's Hawks. *Condor* 89:676-678.
8. JOHNSGARD, P.A. 1978. The ornithogeography of the Great Plains states. *Prairie Naturalist* 10:97-112.
9. KOPENY, M.T. 1988. White-tailed Hawk *Buteo albicaudatus*. In: R.S. Palmer (ed.), Handbook of North American birds, Volume 5. Yale University Press, New Haven, Connecticut. p. 74-84.
10. MURPHY, R.K. 1993. History, nesting biology, and predation ecology of raptors in the Missouri Coteau of northwestern North Dakota. Ph.D. Thesis, Montana State University.
11. PALMER, R.S. 1988. Swainson's hawk *Buteo jamaicensis*. In: R.S. Palmer (ed.), Handbook of North American birds, Volume 5. Yale University Press, New Haven, Connecticut. p. 48-73.
12. SCHMUTZ, J.K. 1989. Hawk occupancy of disturbed grasslands in relation to models of habitat selection. *Condor* 91:362-371



A Swainson's Hawk shades its chick in a nest in a hawthorn shrub at the refuge.
R. Murphy

FLORA OF NORTH AMERICA (FNA) SCHEDULED PUBLICATION OF VOLUMES INCLUDING SASKATCHEWAN VASCULAR PLANT FAMILIES

VERNON L. HARMS, Emeritus Professor of Botany, 212-115 Keevil Cres.,
Saskatoon, SK S7N 4P2

Most Saskatchewan naturalists with botanical interests are likely well aware of the on-going *Flora of North America* (FNA) project, in progress for the last two decades. The following represents an abbreviated and unofficial progress report of this major collaborative project, indicating those volumes already published, and anticipated publication dates for future FNA volumes. Also given is a list of the Vascular Plant families in Saskatchewan included in each FNA volume.

The *Flora of North America* (FNA) project is a cooperative program involving botanists from across North America to produce a comprehensive account of the plants of North America. It is intended to serve both as a means of identifying plants, and as a synoptic synthesis or conspectus of the North American flora. The present ongoing FNA project was initiated in the early to mid-1980s, as successor to an earlier but aborted attempt of the mid-1960s and 1970s to then produce a more computerized flora. The present FNA project has been a massive collaborative endeavor involving the efforts of hundreds of North American botanists, using multiple authors,

multiple taxonomic and regional reviewers, and multiple editors. What was envisioned in 1987 to be a flora of 12 volumes to be completed by 2000,¹ has now expanded into a planned 26 volumes for vascular plants, plus three for Bryophytes, and a time-span for its production now anticipated to extend to the year 2011. The publication order of the FNA volumes is not numerically sequential.²

With regard to FNA coverage of the major groups of vascular plants, the treatments of Fern Allies, Ferns and Gymnosperms were completed in 1993 with the publication of Volume 2. Treatments of the monocotyledonous angiosperm families, spanning five FNA volumes (Vols. 22-26), are now nearing completion with the imminent publication of Volume 24, completing the coverage of the grass family. With regard to coverage of the dicotyledonous angiosperms, six volumes (Vols. 3, 4, 5, 19, 20 & 21) have been published, another (Vol. 7) is imminent, and three (Vols. 6, 8 & 9) appear well in progress to nearing completion. This leaves as outstanding nine additional volumes (Vols. 10-18).

Below are listed the 26 scheduled FNA volumes covering vascular plants, with their publication dates (actual or anticipated) and the plant families in Saskatchewan that are included in each volume.²

Volume 1: Published in **1993**. **Introduction:** Including history of FNA, climate, physiography, soils, paleoclimates, paleovegetation, paleofloras, contemporary vegetation, phytogeography, taxonomic botany and floristics, weeds, ethnobotany, economic botany, plant conservation, classification concepts and systems, and overview of plant families.

Volume 2: Published in **1993**. Includes the following SK groups and families: **Pteridopytes:** Lycopodiaceae (Club-moss Family); Selaginellaceae (Spike-moss Family); Isoëtaceae (Quillwort Family); Equisetaceae (Horsetail Family); Ophioglossaceae (Grape-Fern Family); Pteridaceae (Brake-Fern Family); Thelypteridaceae (Marsh-Fern Family); Dryopteridaceae (Wood-Fern Family); Polypodiaceae (Polypody Family); Marsileaceae (Water-Clover Family). **Gymnosperms:** Pinaceae (Pine Family); Cupressaceae (Cypress Family).

Volume 3: Published in **1997**. Includes the following SK families: Nymphaeaceae (Water-Lily Family); Ceratophyllaceae (Hornwort Family); Ranunculaceae (Buttercup Family); Berberidaceae (Barberry Family); Papaveraceae (Poppy Family); Fumariaceae (Fumitory Family); Ulmaceae (Elm Family); Cannabaceae (Hemp Family); Urticaceae (Nettle Family); Myricaceae (Bayberry Family); Fagaceae (Beech Family); Betulaceae (Birch Family).

Volume 4: Published in **2003**. Includes the following SK families:

Nyctaginaceae (Four-o'clock Family);
Cactaceae (Cactus Family);
Chenopodiaceae (Goosefoot Family);
Amaranthaceae (Pigweed Family);
Portulacaceae (Purslane Family).

Volume 5: Published in **2002**. Includes the following SK families: Caryophyllaceae (Pink Family); Polygonaceae (Buckwheat Family); Plumbaginaceae (Leadwort Family).

Volume 6: Publication scheduled for **2007**. Includes the following SK families: Elatinaceae (Waterwort Family); Clusiaceae (St. John's-wort Family); Malvaceae (Mallow Family); Sarraceniaceae (Pitcher-plant Family); Droseraceae (Sundew Family); Cistaceae (Rockrose Family); Violaceae (Violet Family); Cucurbitaceae (Cucumber Family); Loasaceae (Evening-Star Family).

Volume 7: Publication was scheduled for **2006 / 2007**. Includes the following SK families: Salicaceae (Willow Family); Capparaceae (Caper Family); Brassicaceae (Mustard Family); Resedaceae (Mignonette Family).

Volume 8: Publication scheduled for **2007**. Includes the following SK families: Empetraceae (Crowberry Family); Ericaceae (Heath Family); Pyrolaceae (Wintergreen Family); Monotropaceae (Indian-pipe Family); Primulaceae (Primrose Family); Grossulariaceae (Currant Family); Crassulaceae (Stonecrop Family); Saxifragaceae (Saxifrage Family).

Volume 9: Publication scheduled for **2007**. Includes the following SK family: Rosaceae (Rose Family).

Volume 10: Publication scheduled for **2008**. To include the following SK family: Fabaceae (Pea Family) *in part*.

Volume 11: Publication scheduled for **2008**. To include the following SK families: Fabaceae (Pea Family) *in part*; Elaeagnaceae (Oleaster Family); Haloragaceae (Water-Milfoil Family); Lythraceae (Loosestrife Family); Onagraceae (Evening-Primrose Family).

Volume 12: Publication scheduled for **2009**. To include the following SK families: Cornaceae (Dogwood Family); Santalaceae (Sandalwood Family); Viscaceae (Mistletoe Family); Celastraceae (Staff-tree Family); Euphorbiaceae (Spurge Family); Rhamnaceae (Buckthorn Family); Vitaceae (Grape Family); Linaceae (Flax Family); Polygalaceae (Milkwort Family).

Volume 13: Publication scheduled for **2010**. To include the following SK families: Aceraceae (Maple Family); Anacardiaceae (Sumac Family); Oxalidaceae (Wood-Sorrel Family); Geraniaceae (Geranium Family); Balsaminaceae (Jewelweed Family); Araliaceae (Ginseng Family); Apiaceae (Carrot Family).

Volume 14: Publication scheduled for **2011**. To include the SK families: Gentianaceae (Gentian Family); Apocynaceae (Dogbane Family); Asclepiadaceae (Milkweed Family); Solanaceae (Nightshade Family); Convolvulaceae (Morning-glory Family); Cuscutaceae (Dodder Family); Menyanthaceae (Buckbean Family).

Volume 15: Publication scheduled for **2009**. To include the SK families: Polemoniaceae (Phlox Family); Hydrophyllaceae (Waterleaf Family); Boraginaceae (Borage Family).

Volume 16: Publication scheduled for **2009**. To include the SK families: Verbenaceae (Vervain Family);

Lamiaceae (Mint Family); Hippuridaceae (Mare's-Tail Family); Callitrichaceae (Water-Starwort Family); Plantaginaceae (Plantain Family); Oleaceae (Olive Family).

Volume 17: Publication scheduled for **2010**. To include the following SK families: Scrophulariaceae (Figwort Family); Orobanchaceae (Broomrape Family).

Volume 18: Publication scheduled for **2011**. To include the SK families: Pedaliaceae (Sesame Family); Lentibulariaceae (Bladderwort Family); Campanulaceae (Bellflower Family); Rubiaceae (Madder Family); Caprifoliaceae (Honeysuckle Family); Adoxaceae (Moschatel Family); Valerianaceae (Valerian Family); Dipsacaceae (Teasel Family).

Volumes 19: Published in **2005**. Includes the following SK family: Asteraceae (Aster Family) *in part*.

Volumes 20: Published in **2005**. Includes the following SK family: Asteraceae (Aster Family) *in part*.

Volumes 21: Published in **2005**. Includes the following SK family: Asteraceae (Aster Family) *in part*.

Volume 22: Published in **2000**. Includes the following SK families: Butomaceae (Flowering-Rush Family); Alismataceae (Water-Plantain Family); Hydrocharitaceae (Waterweed Family); Scheuchzeriaceae (Rannoch-Rush Family); Juncaginaceae (Arrow-Grass Family); Potamogetonaceae (Pondweed Family); Ruppiaceae (Ditch-Grass Family); Najadaceae (Pondweed Family); Zannichelliaceae (Horned Pondweed Family); Acoraceae (Calamus Family); Araceae (Arum Family); Lemnaceae (Duckweed Family); Commelinaceae (Spiderwort

Family); Juncaceae (Rush Family); Sparganiaceae (Bur-reed Family); Typhaceae (Cat-tail Family).

Volume 23: Published in **2002**. Includes the following SK family: Cyperaceae (Sedge Family).

Volume 24: Publication was scheduled for **2006/2007**. Includes the following SK family: Poaceae (Grass Family) *in part*.

Volume 25: Published in **2003**. Includes the following SK family: Poaceae (Grass Family) *in part*.

Volume 26: Published in **2002**. Includes the following SK families: Liliaceae (Lily Family); Iridaceae (Iris Family); Smilacaceae (Greenbrier Family); Orchidaceae (Orchid Family).

The text of the treatments in published volumes can be accessed from the referenced FNA online site.³

1. MORIN, N. R. (ed.). 1987. Flora of North America News. Flora of North America Newsletter. Vol. 1, No. 1, p. 2.
2. FLORA OF NORTH AMERICA web site: <http://www.fna.org/publ-sched-details.shtml>
3. E-FLORA web site: http://www.efloras.org/flora_page.aspx?flora_id



Twin Arnica, Arnica sororia.

Joanne Marchand

SMALL WHITE LADY'S-SLIPPER, *Cypripedium candidum*, COLLECTED IN SASKATCHEWAN IN 1895

BERNARD DE VRIES, 29 Hogan Place, Emerald Park, SK S4L 1C1

Small White Lady's-slipper, *Cypripedium candidum* Muhl. ex Willd., was collected once in Saskatchewan, in 1895, and there have been no additional records since that date. The 1895 specimen, now housed at the Department of Agriculture, Central Experimental Farm, Ottawa (DAO) is labeled: "Ex Herb. Central Experimental Farm, Ottawa, Canada; *Cypripedium candidum* Muhl.; Indian Head, Assa.; D. Macoun, 1870½, June 1895." This is the collection on which Maher et al. and Scoggan based their reports of Small White Lady's-slipper occurring at Indian Head in south-eastern Saskatchewan.^{7,8} This early and only collection for Saskatchewan is of significant botanical and historical interest, especially to those involved with documenting rare and endangered species.

The collector, David Macoun, was the nephew of John Macoun, naturalist to the Geological and Natural History Survey of Canada, and accompanied him in exploratory expeditions on the Canadian Prairies during the summers of 1879, 1880, and 1881. At the close of the 1881 season, David Macoun remained in the west, and in 1883 filed on a homestead on SE6-20-11-W2, south of Balcarres, which is north of the Qu'Appelle valley and approximately 30 km northeast of Indian Head.^{5,6} David Macoun was employed as foreman in residence at the newly established Experimental Farm south of Indian Head from 1884 to 1903. It was during this period, in

1895, that Small White Lady's-slipper was collected.

The exact collection location of the 1895 Small White Lady's-slipper specimen is unknown. The fact that D. Macoun was at Indian Head suggests the possibility that this orchid could have been collected in the Strawberry Lakes area about 15 km southwest of Indian Head. This area has some open moist prairies and marshes which are an ecological requirement for this orchid.^{1,3}

Hudson suggested that the collection could have been made in the Qu'Appelle valley, which David Macoun would have had to cross in traveling between his homestead and Indian Head.⁴ Along the south banks of this valley, there are several ravines with ground water seepages that could offer suitable habitat for this orchid. The 1895 record appears to be the only plant collection attributed to David Macoun, since no other collections by him could be located, and this collection of Small White Lady's-slipper could have been a chance occurrence.

The possibility that the Indian Head specimen was based on a plant transplanted to the Experimental Farm seems remote. No records exist that this orchid was grown at the Experimental Station (G. R. Boughton, Superintendent, pers. comm., 1987).

In spite of dramatic changes to the landscape in south-central and eastern

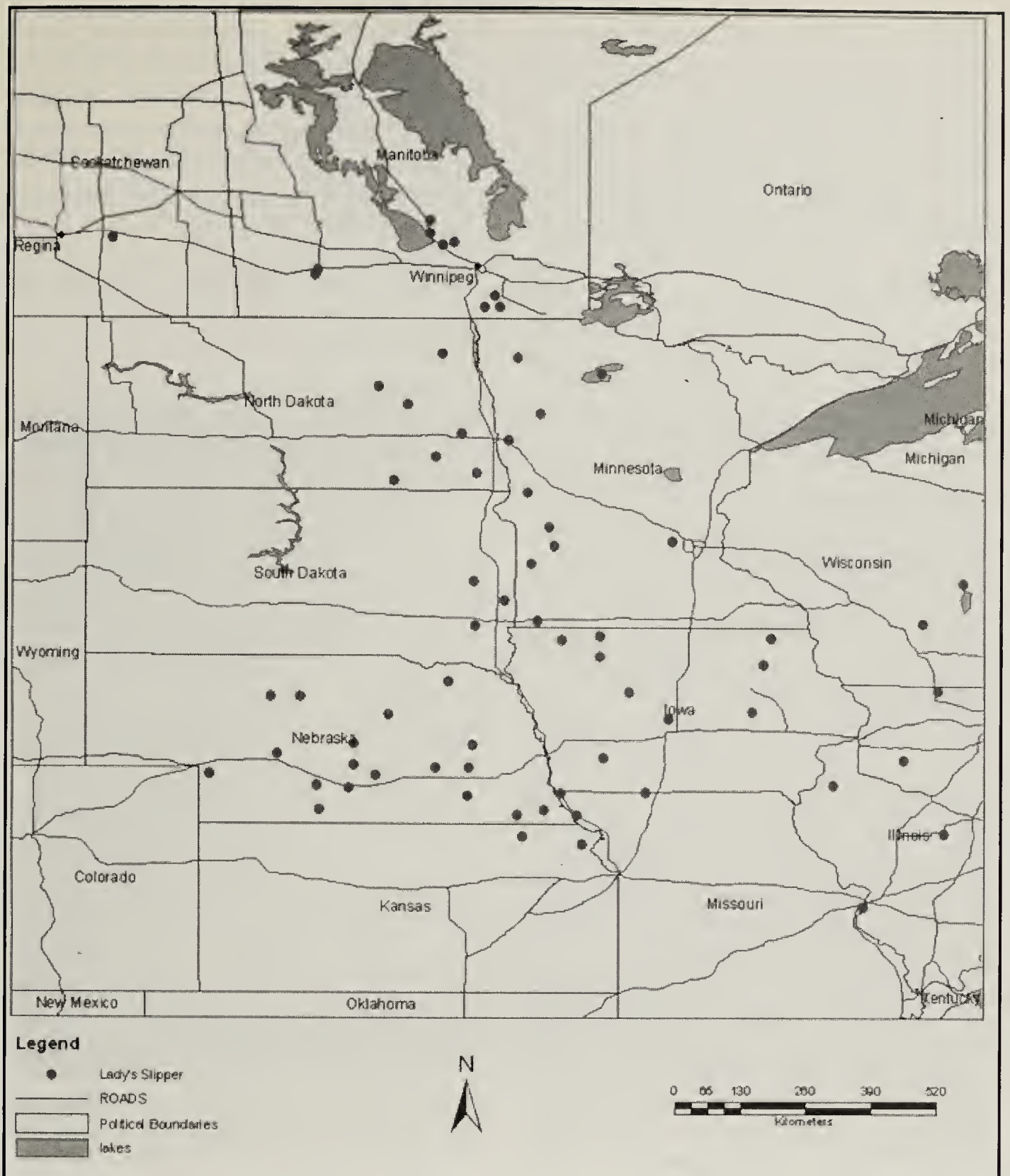


Figure 1. Distribution of Small White Lady's-slipper in western North America.

Saskatchewan, the remote possibility exists that the species could have survived in some isolated remnant of its original habitat in the south-east area of the province. However, since no other records of this orchid were made between 1895 and the present, it is more likely that the species is 'extirpated' in Saskatchewan.

This orchid is found throughout the eastern tall grass prairie, with the main

geographic distribution in eastern North and South Dakota, Nebraska, western Minnesota and Iowa, and southeastern Manitoba (Figure 1). In Manitoba, this species was first reported near Brandon and Aweme by Fletcher (1889), and J.M. Macoun (1903), (A. Breitung, pers. comm., 1986). A later discovery of this orchid was southwest of Brandon some 240 km east of Indian Head (A. Rogosin, Curator Herbarium, University of

Brandon, Manitoba, pers. comm., 1986). Further Manitoba discoveries were south of Steinbach, northwest of Winnipeg in the Warren-Oak Point area, and Tall Grass Prairie Preserve, Tolstoi to Gardenton, St. Laurent, Lake Francis, Brandon, Woodlands, Kleefer, Treherne, and Pembina Hills.² From this distribution pattern, it would appear that this orchid was at its western, as well as northern, range limit in Saskatchewan; a factor affecting its vulnerability to habitat changes.

Acknowledgements

Special thanks are extended to the late A.J. Breitung whose interests in the flora of Saskatchewan led to this particular orchid and prompted research into its fascinating history; J.H. Hudson, Saskatoon; W.J. Cody, Department of Agriculture, Ottawa; G. Argus, National Museums of Canada, Ottawa; M. Shchepanek, Botany Division, National Museums of Canada, Ottawa; G.R. Boughton, Experimental Farm, Indian Head; J.A.G. Howe, Tree Nursery Division, Indian Head; and the staff of the Saskatchewan Archives Board and Land Titles Offices, Regina, for their valuable help in providing information and locating documents necessary for this paper. Thanks are also due to Steve Porter, Data Manager for the

Saskatchewan Conservation Data Centre, Resource Stewardship Branch, Saskatchewan Environment, Regina who prepared the distribution map, based on range maps for this orchid in "Handbook of North Dakota Plants and Species At Risk."

1. BUDD, A.C. 1979. Budd's Flora of the Canadian Prairie Provinces. Research Branch Agriculture Canada, Publication 1662.
2. COSEWIC, in Press. COSEWIC Assessment and Update Status Report on the Small White Lady's-slipper *Cypripedium candidum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.
3. HARMS, V.L. 2003. Checklist of the Vascular Plants of Saskatchewan and the Provincially and Nationally Rare Native Plants in Saskatchewan. University of Extension Press, University of Saskatchewan, Saskatoon.
4. HUDSON, J. 2005. Further to the Small White Lady's Slipper. Letter to Nature Views, Nature Saskatchewan, Fall Issue.
5. MACOUN, J. 1903. Contribution to Canadian Botany. *Ottawa Field Naturalist* 16(11):221
6. MACOUN, J. 1922. Autobiography of John Macoun, M.A. The Ottawa Field-naturalists' Club.
7. MAHER, R.V., G.W. ARGUS, V.L. HARMS, and J.H. HUDSON. 1979. The Rare Vascular Plants of Saskatchewan. Syllogeus 20. National Museums of Canada, Ottawa.
8. SCOGGAN, H.J. 1978. The Flora of Canada, Part 2. National Museums of Natural Sciences. 91-545.



"Moths had a head start [over butterflies] on floral relationships, as fossil evidence shows that moths are many millions of years older than butterflies. This helps explain why moth pollination is far more common and variable in nature than is butterfly pollination."

Peter Bernhardt, *The Rose's Kiss: A Natural History of Flowers*, p.151

RESULTS OF THE 2006 INTERNATIONAL BUTTERFLY COUNTS IN SASKATCHEWAN

MIKE GOLLOP, 51 Welker Crescent, Saskatoon, SK S7H 3M3 and ANNA LEIGHTON, 328 Saskatchewan Crescent West, Saskatoon, SK S7M 0A4



Figure 1. Cabbage White butterflies mudpuddling near Bjorkdale, 14 August 2006.
John Kozial

Eight international butterfly counts, also called First of July Counts or 1JC, were held in Saskatchewan in 2006. This was the same number as in 2005, although only five of these counts were held in both years.¹ Counts in 2006 were conducted at Bjorkdale, Eastend, Fort Qu'Appelle, Pasquia Hills, Preeceville, Regina, Saskatoon and Waskesiu River. The Eastend, Bjorkdale and Pasquia Hills counts were not done in 2005.

In 2006, 62 species were recorded, compared to 57 in 2005.¹ The total

number of butterflies counted in 2006 was 3669 compared to 6972 in 2005 (of which 5389 were Painted Ladies). Butterflies per party hour in 2006 was 48 compared to 86 in 2005, although if Painted Ladies were removed from the 2005 count, the butterflies per party-hour would have been only 27. (The number of butterflies counted per party-hour is a measure that relates butterfly numbers to observer effort, to provide a comparable index of abundance over years.)

Count conditions were consistent

Table 1. 1JC statistics - Saskatchewan 2006

1JC name	1JC date	no. of spp.	no. of b'flies	b'flies/ph	no. of obs.	no. of ph	ph on foot	km on foot	km by car	time	% sun am:pm	temp. deg.C	wind km/hr
WaR	Jun 4	15	175	21	2	8.2	8.2	8.6	0	0930-1615	20:75	21	light
Reg	Jun 22	18	350	28	6	12.5	9.5	13	3	0900-1500	100:95	18-22	3-15
FtQ	Jun 24	25	115	19	4	6	5	8	45	1030-1600	100:50	23	8
Bjo	Jul 3	21	455	57	1	8	4	5	35	0900-1700	100:80	19-22	10-20
PaH	Jul 6	23	374	47	1	8	1	2	20	0900-1700	100:100	22-31	5-15
Sto	Jul 8	28	429	21	11	20	24	11.2	45	0900-1700	90:90	19-24	22-35
Pre	Jul 22	18	619	88	6	7	4	6	20	0830-1530	90:75	20-32	0-40
Eas	Aug 10	13	1152	164	2	7	7	23	0	0930-1510	100:100	20-26	10
totals	8 1JCs	62	3669	48	27	77	63	77	169			18-32*	0-40*

Abbreviations: WaR = Waskesiu River, Reg = Regina, FtQ = Fort Qu'Appelle, Bjo = Bjorkdale, PaH = Pasquia Hills, Sto = Saskatoon, Pre = Preeceville, Eas = Eastend, spp. = species, * extremes for the year, ph = party hours.

among counts in 2006, with temperatures ranging from a low of 18°C at Regina to a high of 32°C at Preeceville (Table 1). Wind speeds increased to 35 and 40 km/hr on the Saskatoon and Preeceville counts, respectively, and may have influenced the number of open field butterflies seen on those counts. The number of observers was about the same in both years, and in 2006 ranged from one on the Bjorkdale and Pasquia Hills counts to 11 at Saskatoon. A total of 77 party-hours were logged, ranging from six at Fort Qu'Appelle to 20 at Saskatoon.

Species totals on the eight counts ranged from 13 at Eastend to 28 at Regina, and averaged 20 per count for the eight counts. This was up from an average of 18 per count in 2005. Species counts remained down from earlier years, despite the second year of moisture for most of the prairies and in an outstanding flower bloom in many areas. Too much moisture in the northeast of the province, however, reduced numbers on the Bjorkdale and Pasquia Hills counts. In contrast, the southwest had very dry conditions for much of the season, and at Eastend, only 13 species were found, 12 species fewer than the lowest number found in the six previous comparable counts.

Numbers of individual butterflies per count ranged from 115 at Fort Qu'Appelle to 1152 at Eastend.

Cabbage Whites accounted for 837 of the Eastend total (Table 2). As was the case for Painted Ladies in 2005, the high number of Cabbage Whites in 2006 demonstrates how a single species can inflate figures. (See Figure 1.) The number of individual butterflies per party-hour ranged from 19 at Fort Qu'Appelle to 164 at Eastend.

The species with the highest number of individuals seen were Cabbage White at 1502, and Clouded Sulphur at 449. The number of Cabbage Whites was exceptionally high for Saskatchewan 1JCs. In counts held in the past 10 years, numbers of individuals of this species averaged 336 per year; the highest previous total was 456, recorded in 2003.^{2,3} Cabbage Whites appeared in unusually high numbers early in the season in 2006, at least in south-central parts of the province, as indicated by observations in the Allan Hills by the second author: seven Cabbage Whites on May 7, and nine on May 14. Good conditions for survival and reproduction must have existed in many parts of the province in 2006, as indicated by the build up of numbers seen in the 1JCs (Table 2).

Although Clouded Sulphur numbers (449) were high compared to 2005 numbers (65), they were lower than the 10-year average of 563. Only two years in the past 10 have had lower numbers: 2000 with 295 and 2001 with 339. The

Table 2. 1JC results - Saskatchewan 2006

SPECIES NAME	WaR* 4 JN	Reg 22 JN	FtQ 24 JN	Bjo 3 JY	PaH 6 JY	Sto 8 JY	Pre 22 JY	Eas 10 AU	Totals
Silver-spotted Skipper		1				1			2
Northern Cloudywing	1								1
Dreamy Duskywing	14								14
Juvenal's Duskywing									
Afranius Duskywing									
Persius Duskywing	1								1
Grizzled Skipper									
C. Checkered Skipper			2						2
Common Sootywing									
Unident. Skipper		6						74	80
Arctic Skipper	13		1						14
Least Skipper									
Garita Skipperling		36	16			1			53
European Skipper		18							18
Uncas Skipper									
C. Branded Skipper									
Plains Skipper								27	27
Dakota Skipper									
Nevada Skipper									
Peck's Skipper									
Draco Skipper									
Tawny-edged Skipper			1						1
Long Dash Skipper		9	9	2	13	2			35
Rhesus Skipper									
Delaware Skipper									
Woodland Skipper								10	10
Hobomok Skipper									
Dun Skipper				7	3	1	1		12
Dusted Skipper									
Oslar's Roadside Skipper									
Com. Roadside Skipper		3							3
Old World Sw'tail (Dods)								2	2
Old World Sw'tail (Huds)					1				1
Anise Swallowtail									
Anise/ Old World Sw'tail									
Can. Tiger Swallowtail	36	1	2	3	3				45
Unident. White									
Western White		10	3			3			16
Margined White									
Mustard White				23	24				47
Cabbage White		20	2	142	18	206	277	837	1502
Large Marble									

	WaR	Reg	FtQ	Bjo	PaH	Sto	Pre	Eas	totals
Olympia Marble									
Unident. Sulphur									
Clouded Sulphur	3	24	1	14	4	97	172	134	449
Orange Sulphur									
Q. Alexandra's Sulphur									
Christina Sulphur						4			4
Giant Sulphur									
Pink-edged Sulphur				23	17				40
Harvester									
Unident. Copper									
Gray Copper									
Bronze Copper							1		1
Ruddy Copper									
Dorcas Copper					2				2
Purplish Copper		18					2		20
Acadian Hairstreak									
Coral Hairstreak			1						1
Edwards' Hairstreak									
Banded Hairstreak									
Striped Hairstreak						1			1
Unident. Elfin									
Brown Elfin									
Hoary Elfin									
Eastern Pine Elfin									
Western Pine Elfin									
Gray Hairstreak									
Unident. Blue		18							18
West. Tailed Blue	40	1	5	18	38	1			103
Spring Azure	7								7
Summer Azure									
Rocky Mt. Dotted Blue									
Arrowhead Blue									
Silvery Blue	48	40	18	55	6				167
Northern Blue			1	3	12				16
Melissa Blue		2	7			1		14	24
Greenish Blue	1	11	1		4	2			19
Boisduval's Blue									
Lupine (Acmon) Blue									
Prairie Arctic Blue									
Unident. large Fritillary						2	27	38	67
Variegated Fritillary							2		2
Great Spangled Frit.						11	4		15

		WaR	Reg	FtQ	Bjo	PaH	Sto	Pre	Eas	totals
Aphrodite	Fritillary							4	1	5
Edwards'	Fritillary									
Zerene	Fritillary									
Callippe	Fritillary			10	1		1		1	13
Atlantis	Fritillary				10	68				78
Northwestern	Fritillary			2	6	10	8	3	3	32
Mormon	Fritillary								1	1
<i>Unident. small</i>	<i>Fritillary</i>							2		2
Bog	Fritillary				1					1
Silver-bordered	Fritillary				3		1			4
Meadow	Fritillary						5	12		17
Frigga	Fritillary	3								3
Freija	Fritillary	3								3
Arctic	Fritillary									
Gorgone	Checkerspot			1						1
Sagebrush	Checkerspot									
<i>Unident. Crescent</i>										
Pearl	Crescent			1			3		4	8
Northern	Crescent	1		6	26	19	5	1		58
Tawny	Crescent			2			1	2		5
Variable	Checkerspot									
<i>Unident. Comma</i>										
Eastern	Comma									
Satyr	Comma	1				1	3			5
Green	Comma					1				1
Hoary	Comma									
Gray	Comma				1	1		4		6
Compton	Tortoiseshell						1			1
Mourning	Cloak						2			2
Milbert's	Tortoiseshell		4	1	32	96	7			140
Painted	Lady									
Red	Admiral									
White	Admiral		11	10	77	28	28	6		160
Viceroy						4	1			5
Northern	Pearly-Eye				2					2
Eyed	Brown									
Little	Wood-Satyr									
Common	Ringlet		110	9	6	1	8			134
<i>Unident. Wood-Nymph</i>										
Com. Wood-Nymph							22	91	5	118
Small Wood-Nymph										
<i>Unident. Alpine</i>										
Taiga	Alpine									

	WaR	Reg	FtQ	Bjo	PaH	Sto	Pre	Eas	totals
Red-disked Alpine Common Alpine Ridings' Satyr	3								3
<i>Unident. Arctic</i> Macoun's Arctic Uhler's Arctic									
Jutta Arctic Monarch		7	3				8	1	19
<i>Unident. butterfly</i>									
Total number of species	15	18	25	21	23	28	16	13	62
Total number of butterflies Count location	175 WaR	350 Reg	115 FtQ	455 Bjo	374 PaH	429 Sto	619 Pre	1152 Eas	3669 totals

*WaR = Waskesiu River, Reg = Regina, FtQ =Fort Qu'Appelle, Bjo = Bjorkdale, PaH = Pasquia Hills, Sto = Saskatoon, Pre = Preeceville, Eas = Eastend.



Figure 2. White Admiral, Nisbet Forest, 14 June 2006 Juhachi Asai

highest were 1140 (in 2003) and 957 (in 1999).^{2,3}

Unusually high species counts at individual locations included 23 Pink-edged Sulphurs and 77 White Admirals (Figure 2) at Bjorkdale, 12 Northern

Blues, 68 Atlantis Fritillaries and 96 Milbert's Tortoiseshells at Pasquia Hills and 8 Monarchs at Preeceville.

Virtually all of the common species that might be expected, considering the dates and locations of the eight counts,



Figure 3. Monarch with damaged wing, Nisbet Forest, 10 August 2006

Juhachi Asai

were found in 2006. Painted Ladies, the species that dominated counts in 2005 and accounted for 77% of all butterflies seen, were absent from the 2006 counts. Red Admirals, another species that routinely fluctuates dramatically in numbers, also were not seen this year.

The only provincially rare species counted in 2006 was European Skipper: 18 were seen at Regina, where they have recently become established and apparently are increasing. Northern Blues, an unusual butterfly on 1JCs, were reported from three counts, including Fort Qu'Appelle (see photograph on back cover).

The Nisbet Forest count, usually held at the end of July or early August, was initiated on August 10 this year but was canceled due to heavy cloud cover and rain in the morning. On the first leg of the survey, however, a Monarch was

found on the ground in a patch of Low Milkweed (*Asclepias ovalifolia*) in the forest. This individual was unable to fly, due to a malformed front wing, so it was assumed to have emerged at the site (Figure 3). In early afternoon, when the sun began to shine, four additional Monarchs were seen at the milkweed patch. All were in fresh condition and, after sitting briefly on the spruce trees at the site, flew away. No chrysalids were located but it appeared that these individuals had emerged earlier that day. A sixth Monarch was found that morning lying dead on a path.

1, GOLLOP, M. and A. LEIGHTON. 2005. Results of the 2005 International Butterfly Count in Saskatchewan. *Blue Jay* 63:193-199

2. LEIGHTON, A. 2000-2003. Saskatchewan Butterflies 2000, 2001, 2002, 2003. Annual reports published privately.

3. LEIGHTON, A. and B. GOLLOP, 1998-1999. Saskatchewan Butterflies 1998, 1999. Annual reports published privately.

③

Jun 18 '98

plop! This wall fell (most of it) while I there, leaving a
 dk crescent which bird pecked away at.

Too much wet moss on? Or perhaps dry and off (dry)

Empty nest

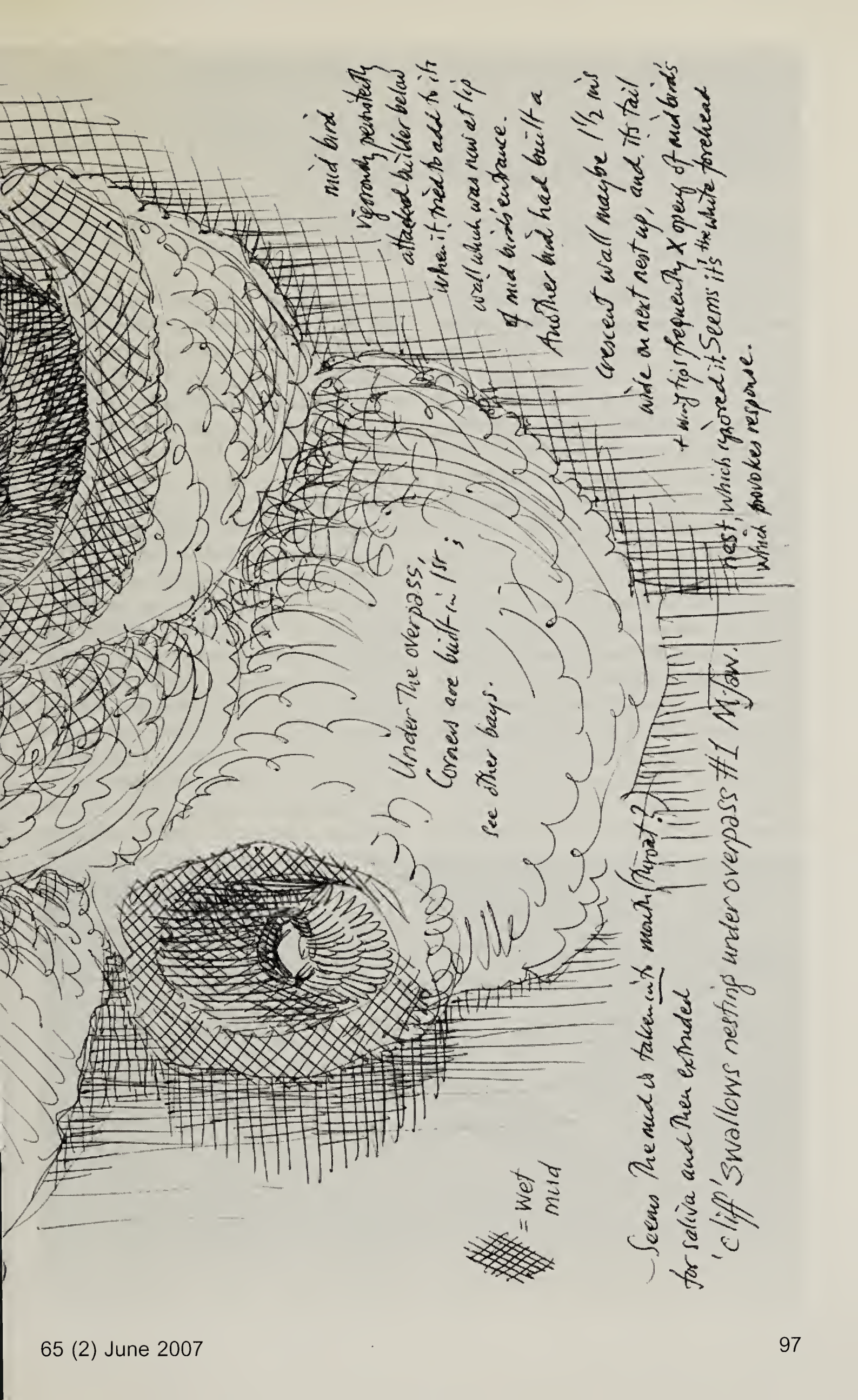
too quickly --

sucking moisture
 out of it --



this bird
 + p. fly is in
 + at (as nest) ignored
 on their wall,
 builder or not sight of
 prob. because out of sight of
 hole, + not close enough

Paul Geraghty ©



mud bird
vigorously penetrated
attached builder below
when it tried to add to its
wall which was new at top
of mud bird's entrance.
Another bird had built a

crescent wall maybe 1 1/2 ins
wide on next nest up, and its tail
+ wing tips frequently X open of mud bird's
nest, which ignored it. Seems it's the white forehead
which provokes response.

Under the overpass,
Corners are built in 1st;
see other bays.

= wet
mud

Seems the mud is taken in to mouth (throat?)
for saliva and then extruded
'cliff' Swallows nesting under overpass #1 M. Jan.

INTRODUCED LEAFY SPURGE HAWKMOTH, *Hyles euphorbiae* L., APPEARS IN SASKATOON

TYLER J. WIST, City of Saskatoon Pest Management, 1101 Avenue P North, Saskatoon, SK

Leafy Spurge, *Euphorbia esula*, is a noxious Eurasian weed that infests thousands of acres of range and pasture land in North America. Like many invasive plants, Leafy Spurge is difficult and expensive to control using conventional herbicide treatments. Its milky latex is poisonous to cattle and its highly competitive nature displaces native rangeland grasses, leaving behind an inedible monoculture of 40-80 cm tall weeds. The latex contains enzymes and toxins that prevent most North American insects from foraging on its leaves. To control Leafy Spurge, an insect specialized to feed on spurge and not on other host plants was looked for in its natural home range. This is an example of classical biological control in which a foreign predator is introduced to control a foreign plant that has become a

serious pest. Classical biological control has had several extraordinary successes, such as the introduction of *Cactoblastis cactorum* to control Prickly Pear Cactus in Australia, but for every one of these successes there are also failures.

The release of the Leafy Spurge Hawkmoth, *Hyles euphorbiae* L., (Lepidoptera: Sphingidae) was the first of fifteen attempts at classical biological control of Leafy Spurge in North America. In 1961, the Leafy Spurge Hawkmoth was imported from Europe and tested to see if it would eat spurge species native to North America. Larvae of the Leafy Spurge Hawkmoth (Figure 1) seemed to feed primarily on members on the genus *Euphorbia* and were capable of feeding on both native species originally tested: Spotted



Figure 1. Larvae of the Leafy Spurge Hawkmoth.

Tyler Wist

Spurge, *E. maculata* and Snow-on-the-Mountain, *E. marginata*.⁵ Based on this, it was hypothesized that the larvae could also feed on the other 108 spurge species that were native to North America.¹¹ Despite being only slightly host specific to Leafy Spurge and having the potential to attack the 110 native *Euphorbia* species, the assessment of the potential for biological control by the Leafy Spurge Hawkmoth continued in North America. It was determined that any *Euphorbia* species with commercial value such as Poinsettia (*E. pulcherrima*), or spurge plants with potential for latex rubber production such as the Palo Amarillo tree (*E. fulva*) would not be in immediate danger from the release of biological control agents against Leafy Spurge.⁶ Insects introduced for classical biological control must go through a rigorous series of quarantines and tests before they are released into their new environment to reduce the possibility of problems with the introduction. Leafy Spurge Hawkmoth larvae performed well and were demonstrated to decimate Leafy Spurge plants when the larvae were sealed together with them in glass containers.¹ Several exciting demonstrations of their potential for biological control and few questions about their safety in North America led to their approval for release in 1964 and subsequent initial mass release in 1965.¹

Introduction of the Leafy Spurge Hawkmoth continued across Canada and into several states, and included a release into a stand of Cypress Spurge, *E. cyparissias*,⁶ in Ontario. Subsequently, Leafy Spurge Hawkmoth populations became established at several sites in Ontario,⁵ New York State² and Montana.⁵ Several Saskatchewan sites were also included in the open release of larvae,

including the first at Jameson in 1966 followed by Moose Jaw Creek, Balgonie and Milestone in 1967 and a final release of 600 pupae and 37 larvae at Regina Beach in 1974.⁵

Although Leafy Spurge Hawkmoth populations established at several release sites the species did not realize its potential as a control agent. Often Leafy Spurge Hawkmoth populations established at densities too low to effect any amount of control.⁶ In spite of their large body size and voracious appetites, they did little to keep any of the trial Leafy Spurge populations under control, and the number of adult hawkmoths that were eventually produced was low due to pupal mortality from predation³ and diseases introduced from Europe with the larvae.^{6,12} Mice and especially ants were implicated as the worst predators of Leafy Spurge Hawkmoth pupae and larvae.^{3, 4, 5} The earliest releases had larval mortalities of greater than 95% within two weeks of release and those larvae that did survive, due to a later release date, developed too slowly to pupate before winter.⁴ Also, Leafy Spurge was adept at re-growing shoots and leaves from its extensive perennial root system, so growth consumed by Leafy Spurge Hawkmoth larvae was quickly replaced.¹¹

The hawkmoth had all but disappeared in North Dakota,⁹ one of its original United States release sites and did not appear to be well established in any areas where it was originally released. A glimmer of hope for Leafy Spurge Hawkmoth survival in Canada came from Braeside, Ontario where a population did establish, even though it was below an effective level for control of Leafy Spurge, and spread to Cypress Spurge stands in an 80 km² radius within five years.⁵ Ten thousand larvae from this Braeside site were

reared in the laboratory and released in Montana and had, as of 1974, established there as well.⁵ At other sites, released Leafy Spurge Hawkmoth larvae failed to establish and faded away to extinction in the area. For instance, none of the 224 larvae released at Cardston, Alberta in 1978 was recovered.⁸ Undaunted, Leafy Spurge researchers carried on and finally identified several flea beetles that could become established and were effective against Leafy Spurge - but this is a story for another time.

In late August of 2006, a City of Saskatoon weed inspector was surprised to discover dozens of “huge” black, red and orange larvae feeding at one of the two known Leafy Spurge sites in Saskatoon. A larva was brought to the Pest Management Department where technicians identified it as a fifth instar Leafy Spurge Hawkmoth larva. Upon further inspection it was discovered that a colony of Leafy Spurge Hawkmoth larvae was feeding in a small patch of Leafy Spurge in a vacant lot on the corner of Avenue P South and 14th Street West. The first Leafy Spurge bio-control agent had appeared from obscurity in Saskatoon! Scattered reports from across the prairies indicate that the Leafy Spurge Hawkmoth has made periodic reappearances in patches of Leafy Spurge, such as one in Montana, its original United States release site in 1966.⁷ Students in the Davis laboratory at the University of Saskatchewan observed and captured larvae in late spring of 2006 in Douglas Provincial Park where Leafy Spurge infests many acres of land. One of the captured larvae pupated and emerged by the summer suggesting that in South/Central Saskatchewan at least, Leafy Spurge Hawkmoth may have two generations per year.

The Leafy Spurge Hawkmoth larvae are commonly called “hornworms” in reference to the horn-like structure on their posterior, dorsal end. These larvae appear similar in body plan to the more commonly observed tomato hornworm, *Manduca quinquemaculata*, but with a strikingly different colour pattern. The fifth instar larvae are black, red, and orange with two conspicuous white dots per segment and numerous smaller white dots set against their orange and black sections (Figure 2, on inside back cover). Interestingly, this patterning still makes these large caterpillars difficult to see in a patch of Leafy Spurge, and their bright red sections probably serve as a warning to predators that these larvae contain Leafy Spurge toxins. Larvae are nearly 10 cm in length in their final instar before pupation and have a curved red or orange “horn” with a black tip. Larvae have four pairs of prolegs and one pair of anal prolegs. The adult hawkmoth has a wingspan of 5-7 cm and distinctive pink colouration on the upper surface of its hind wings (Figure 3, on inside back cover). Commonly referred to as the “Leafy Spurge Hawkmoth” or “Hummingbird” moth because of its feeding habit of hovering over flowers with rapidly beating wings, this diurnal moth visits flowers near patches of Leafy Spurge. It was estimated that there were approximately two dozen Leafy Spurge Hawkmoth larvae within a four metre square patch of Leafy Spurge (6 larvae per m²) at the Avenue P site. However this level was below the control threshold of 14 larvae per m² so it is not surprising that the Leafy Spurge stand seemed unharmed by the hornworm infestation.¹⁰

The second known patch of Leafy Spurge in Saskatoon is located on the corner of Warman Road and 51st Street on the west side of the Extra Foods

building. This location did not have any Leafy Spurge Hawkmoth larvae in August of 2006. As a small scale and probably fruitless attempt at biological control, we transferred six larvae from Avenue P to Leafy Spurge plants on 51st Street on August 24, 2006. It was hoped that, given time, the Leafy Spurge Hawkmoth would establish and provide supplementary control of the Leafy Spurge in the area. By August 30 three captive larvae had pupated and all larvae had disappeared from both sites and were presumed to have pupated as well. The origin of the Leafy Spurge Hawkmoths found in Saskatoon is unknown and is an interesting mystery to unravel. If a population had indeed established in Montana it is feasible that this site could be the origin of these Leafy Spurge Hawkmoths but it is more probable that our visitors were descendants of those released in the late 1960s in Saskatchewan. It will be exciting to see if the Leafy Spurge Hawkmoth establishes a population in Saskatoon, however, it is more likely that this colourful infestation will serve only to give us a brief glimpse into the history of biological control of Leafy Spurge in North America.

Acknowledgements

I would like to thank Jennifer Kostyk for working with me to discover more about the Leafy Spurge Hawkmoth, the City of Saskatoon for tracking Leafy Spurge sites, the City of Saskatoon weed inspector, Terri Smith, for bringing us our first larva, and Jacqueline Hulm for her helpful review of this manuscript.

1. ANDERSON G.L., E.S. DELFOSSE, N.R. SPENCER, C.W. PROSSER and R.D. RICHARD. 2000. Biological Control of Leafy Spurge: An Emerging Success Story. *Proceedings of the X International Symposium on Biological Control of Weeds* 15 4-14 July 1999, Montana State University, Bozeman, Montana, USA Neal R. Spencer [ed.]. pp. 15-25.

2. BATRA, S.W.T. 1983. Establishment of *Hyles euphorbiae* (L.) (Lepidoptera: Sphingidae) in the United States for control of two weedy spurges, *Euphorbia esula* L. and *E. cyparissias* L. *Journal of the New York Entomological Society* 91:304-311.

3. FORWOOD, J. R. and MCCARTY, M. K. 1980. Control of Leafy Spurge (*Euphorbia esula*) in Nebraska with the spurge hawkmoth (*Hyles euphorbiae*). *Weed Science* 28(3): 235-240.

4. HARRIS, P. and ALEX, J. 1971. *Euphorbia esula* L. Leafy Spurge, and *E. cyparissias* L., cypress spurge (Euphorbiaceae). Pages 83-88 In :Biological Control Programmes Against Insects and Weeds in Canada 1959-1968. Technical Communication of the Commonwealth Institute of Biological Control 4.

5. HARRIS, P. 1984. *Euphorbia esula-virgata* complex, Leafy Spurge and *E. cyparissias* L., cypress spurge (Euphorbiaceae). In: Biological Control Programs Against Insects and Weeds in Canada 1969-1980. Kelleher, J.S., and Hulme, M.A. (eds.). Commonwealth Agriculture Bureau. 159-69 pp.

6. HARRIS P., P.H., DUNN, D. SCHROEDER and VONMOOS R. 1985. Biological control of Leafy Spurge in North America. Leafy Spurge, Monograph series of the Weed Science Society of America. ed. Alan K. Watson,. Chapter 8 (3):79-92.

7. KNODEL, J. 2006. Leafy Spurge Hawkmoth. *North Dakota State University Crop and Pest Report* 11:2.

8. McCLAY, A.S., D.E., COLE, P. HARRIS and RICHARDSON, C.J. 1995. Biological Control of Leafy Spurge in Alberta: Progress and Prospects Biological Control of Leafy Spurge in Alberta: Progress and Prospects. AECV95-R2, 63 pp.; 29 ref.

9. MESSERSMITH, C.G. and LYM, R.G. 1990. Leafy Spurge control: 10 years of research enhancement. *North Dakota Farm Research*. 47(6):3-6.

10. NEW, T.R. 1971. The consumption of *Euphorbia cyparissias* (Euphorbiaceae) by larvae of *Celerio euphorbiae* (Lepidoptera: Sphingidae). *Canadian Entomologist*. 103:59-66.

11. PEMBERTON, R.W. 1984. Native plant considerations in the biological control of Leafy Spurge *Proceedings of the VI International Symposium for the Biological Control of Weeds*. August 19-25 1984, pp. 365-390.

12. SPENCER, N.R. 1994. Imported insect establishment for Leafy Spurge (*Euphorbia esula*) control. *Proceedings of the Great Plains Agriculture Council*, Lincoln, NE: The Council. 1994. pp. 13-17.

AQUATIC INVERTEBRATES

A PRELIMINARY CHECK LIST OF AQUATIC MACROINVERTEBRATES ASSOCIATED WITH MEADOW BANK LAKE IN VAN BRIENEN LAND NATURE SANCTUARY, SK

DALE PARKER, AquaTax Consulting, 1204 Main Street, Saskatoon, SK S7H 0L2 E-mail: dale.parker@sasktel.net

Introduction

Nature Saskatchewan administers a number of nature sanctuaries throughout the province.²⁰ One of its programs involves surveys to document

the plants and animals inhabiting these sanctuaries. This paper reports on the biodiversity of aquatic macroinvertebrates - insects and other invertebrates that live in water and are retained in a 0.2 mm to 0.5 mm meshed net - found associated with Meadow Bank Lake in the Van Brien en Land Nature Sanctuary.

Study Site

Van Brien en Land Nature Sanctuary (103°40' 21" W, 52°06' 08" N) is located 19.7 km northeast of Wadena, Saskatchewan in the aspen parkland ecoregion (Figure 1). The sanctuary includes a 6.5 ha section of Meadow Bank Lake. This small lake has an area of 96 ha. It was dry in the 1940s but has since contained water continuously.²⁰ It receives surface water runoff from surrounding pasture land and cropland. Pasture land borders the north shore of the lake across from the sanctuary. A narrow 8.1 ha strip of mixed bush dominated by Balsam Poplar with an understory of wild roses, honeysuckle, cranberry and other plants separates the south shore from cropland.²⁰ The shoreline is almost entirely ringed by emergent vegetation dominated by bulrushes (*Scirpus validus*) (Figure 2). The substrate is firm clay, silt and sand with many embedded rocks and boulders, all covered with a 20 cm layer

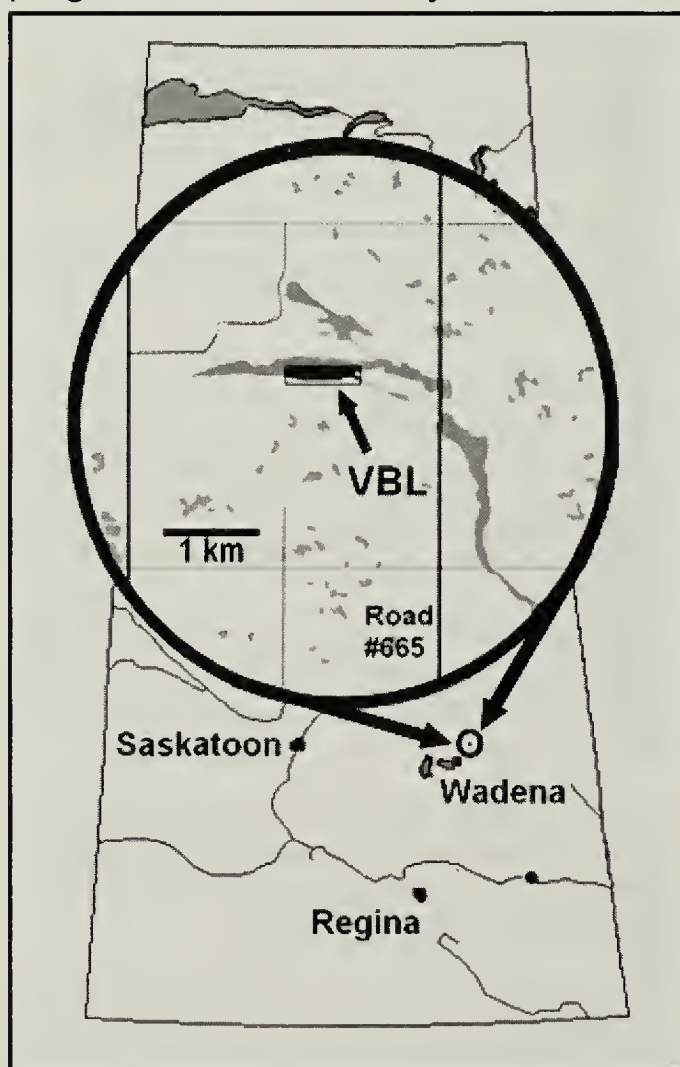


Figure 1: Map of Saskatchewan indicating location of Van Brien en Land Nature Sanctuary. Inset is a large-scale map of Van Brien en Land Nature Sanctuary (VBL) and area of Meadow Bank Lake.

of soft organic ooze. Near the east edge of the sanctuary, tree branches and logs from an active beaver lodge litter the bottom. Aquatic vegetation includes Ivy-leaved Duckweed (*Lemna trisulcus*) in abundance, water milfoil (*Myriophyllum sp.*), and the alga, stonewort (*Chara sp.*). The lake is subject to algal blooms.

Methods

Meadow Bank Lake was visited on four occasions over a three-year period, June 20, 2001, June 5 and August 13, 2002 and July 16, 2003. The delayed spring in 2002 made the June 5 date correspond to mid-May of a more typical year.

Qualitative collections were made by sweeping a 20 cm diameter sieve or 30 cm D-framed aquatic dip net, both with 0.5 mm mesh openings, through the water, and submerged vegetation, and along bottom substrates. A rectangular 20 cm by 10 cm aquarium net with 0.13 mm mesh openings was used to sweep the water surface to collect pupae, pupal exuviae (skins), emerging adults and surface dwelling insects. Submerged rocks and logs were inspected for adhering macroinvertebrates. Net contents were placed in a white pan and visually sorted on site. Sorted macroinvertebrates were preserved in labeled jars containing 100% alcohol. Aerial sweep nets were used to collect adult insects from the shoreline vegetation. These samples were preserved in 75% alcohol. Representatives of adult damselflies and dragonflies were killed using a killing jar.

In the lab, five to ten specimens of each macroinvertebrate type were picked from the material and preserved in 75% alcohol. Specimens of non-biting midges (Chironomidae) were dissected, cleared and mounted on

microscope slides. Other adult flies, beetles, damselflies and dragonflies were pinned. Identifications were made using a dissecting stereomicroscope and a phase-contrast compound microscope while consulting appropriate identification literature.

Results

Most of the 116 different taxa (distinctive taxonomic groupings) of macroinvertebrates collected in the study were insects (Table 1). Two-winged flies (Diptera) were the most diverse group collected: 39 taxa were collected including 24 taxa of non-biting midges (Chironomidae). The beetles (Coleoptera) were the second most diverse insect group with 28 taxa collected. These included 11 taxa of diving beetles (Dytiscidae), eight water-scavenging beetles and six taxa of crawling beetles (Haliplidae). Other insect groups collected were three mayflies (Ephemeroptera), and ten species of damselflies and dragonflies (Odonata). True bugs (Hemiptera) were represented by nine species of water boatman (Corixidae) and two species of backswimmers (Notonectidae). Seven species of caddisflies (Trichoptera) were also collected from the pond. Non-insects included six species of leeches and nine of snails. Significantly, no fish were collected in any of the samples.

The cumulative taxa count graph indicates a steady, approximately linear, increase in new taxa being collected on each sampling date with only a slight presence of a plateau between the last two sampling dates (Figure 3). This suggests there are more macroinvertebrate taxa inhabiting the pond that have yet to be collected and identified.

Discussion

All of the macroinvertebrate taxa



Figure 2: South shoreline of Meadow Bank Lake at Van Brienon Land Nature Sanctuary.
Dale Parker

collected from Meadow Bank Lake have been previously recorded from Saskatchewan and most are widely distributed in the ponds, lakes and rivers of the province.^{2,3,5,7,13,18,25,31,32} Unfortunately, this information is mostly from taxonomic surveys rather than from comprehensive, species level, habitat oriented research.

Strangely absent from the samples were the water striders (Gerridae: Hemiptera). Only a small number were observed on the June 20, 2001 visit but these could not be collected. Water striders are normally common in ponds and sheltered areas of lakes and flowing water.³ Why they were present only in extremely low numbers during the sampling period is not clear. It could be that the shoreline vegetation was not appropriate for them, although certain species do inhabit bulrush vegetated shorelines.²⁴ At present there is no explanation for their apparent extremely low numbers.

The presence of the migratory dragonfly, *Anax junius*, (Common Green Darner) is interesting (see inside front cover). *A. junius* is distributed throughout North America . It has been recorded from every state, including Alaska and Hawaii.³⁰ Records from the latter two states are incidental occurrences. The reproductive range reaches its northern limits in southern and central Canada.^{27,30} Typically the adults arrive in Canada from the United States in early spring and lay eggs. Larvae develop rapidly and the next generation emerges in August.^{19,30} The new adults migrate south, often in large “flocks”, to produce another generation in the southern states.³⁰ However, in southern Ontario at least, two subpopulations of *A. junius* have been identified.^{27,28} One is migratory, as described above, but the other is a year round resident. The adults emerge in late summer and lay eggs in the same general area. Over-wintering occurs as partially grown larvae; however, this

apparently is sporadic.¹⁴ At Meadow Bank Lake adults were observed flying in tandem and laying eggs in shoreline bulrushes on June 5, 2002. Subsequently, mature larvae were collected on August 13, 2002. It is likely the larvae collected were from the egg laying observed in spring and the resulting adults would migrate south.

No fish such as minnows or sticklebacks were collected or observed during the study. This suggests Meadow Bank Lake either freezes to the bottom during the winter, which is not likely as there are beaver present in the lake, or, that the water present under the ice does not contain enough oxygen for fish to survive. Lack of fish predation enhances macroinvertebrate communities, allowing many species to reach greater densities than would occur if fish were present.^{1,12,29,34}

Small lakes, pothole lakes, ponds, sloughs and wetlands are an important part of Saskatchewan's prairie and parkland ecosystems.¹⁰ They not only

provide habitats for wildlife and birds, including waterfowl, but also store and filter water for human and livestock consumption.¹⁰ However, 40% to 70% of the smaller ponds and wetlands in Saskatchewan have been lost or are threatened by agricultural practices and urban sprawl.^{8,10,11} It is expected that global warming will further reduce this number.⁴

These changes to the landscape have resulted in the remaining small lakes and larger ponds becoming increasingly isolated from each other in an "ocean" of cropland. Evidence suggests that isolated water bodies provide less suitable wildlife habitats than do groupings of ponds and wetlands.^{17,33} Meadow Bank Lake and the ponds and wetlands in close proximity to it (Figure 1) should continue to be protected not only for their value as wildlife habitat but also for research purposes.

Aquatic macroinvertebrates are important to the natural functioning of

aquatic ecosystems.²³ They are essential basic links in aquatic food webs, feeding on plants and decaying material, and in turn being food for predators.^{15,21,26} They are important food for waterfowl, fish, amphibians, reptiles, bats and song birds.^{1,6,9} Because they play such an integral role in aquatic habitats, macroinvertebrates are commonly used to monitor the impact of human activity, such as mining, logging and

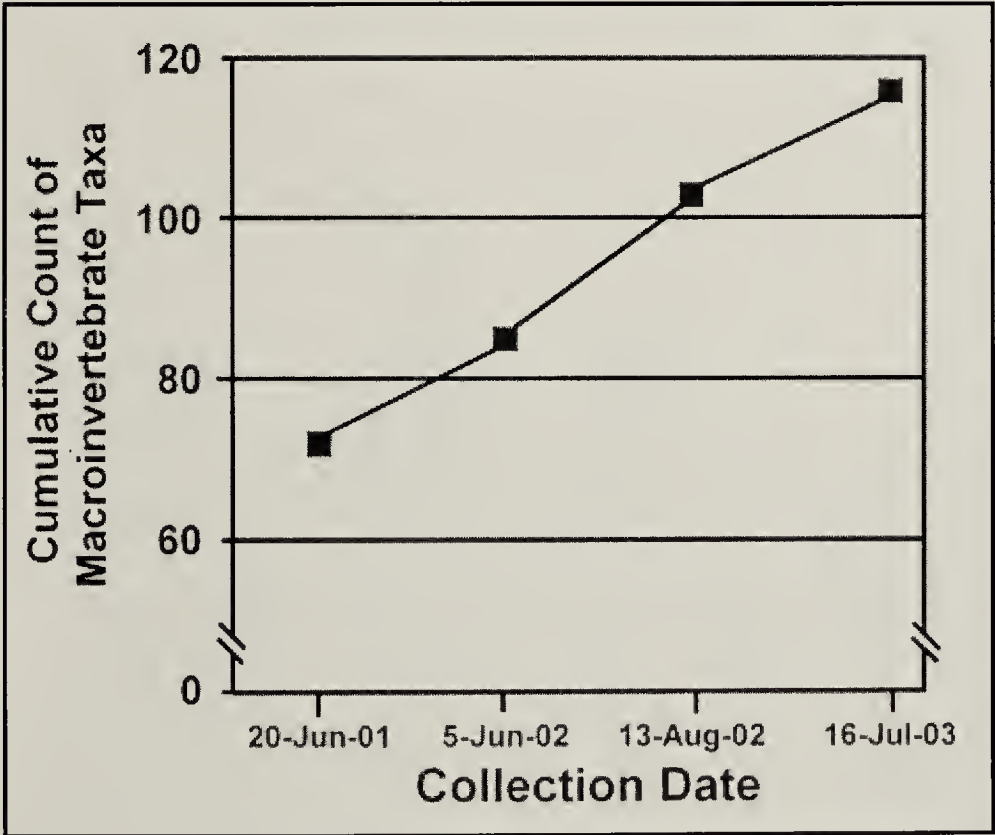


Figure 3: Cumulative count of aquatic macroinvertebrate taxa collected in association with Meadow Bank Lake at Van Brienens Land Nature Sanctuary.

Table 1: Aquatic macroinvertebrates collected in association with Meadow Bank Lake.

(? After a name indicates a tentative identification.)

Hirudinea (Leeches) Erpobdellidae <i>Erpobdella punctata</i> (Leidy) <i>Nephelopsis obscura</i> Verrill Glossiphoniidae <i>Glossiphonia cf complanata</i> (Linnaeus) <i>Helobdella stagnalis</i> (Linnaeus) <i>Placobdella ornata</i> (Verrill) <i>Theromyzon rude</i> (Baird)	Amphipoda (Scuds) Gammaridae <i>Gammarus lacustris</i> Sars Hyalellidae <i>Hyalella azteca</i> (Saussure)
Mollusca Gastropoda (Snails) Lymnaeidae (Pond snails) <i>Lymnaea stagnalis jugularis</i> (Say) <i>Pseudosuccinea columella</i> (Say)? <i>Stagnicola elodes</i> (Say) <i>Stagnicola reflexa</i> (Say) Planorbidae (Ramshorn Snails) <i>Helisoma pilsbryi infracarinatum</i> Baker <i>Helisoma trivolvis subcrenatum</i> Carpenter <i>Gyraulus circumstriatus</i> (Tryon) <i>Promentus exacuus</i> (Say) Physidae (Tadpole Snails) <i>Physa jennessi skinneri</i> Taylor	Insecta Ephemeroptera (Mayflies) Baetidae <i>Callibaetis ferrugineus</i> (Walsh) <i>Callibaetis pallidus</i> Banks Caenidae <i>Caenis amica</i> Hagen
Pelecypoda (Clams) Sphaeriidae (Fingernail and Pea Clams) <i>Pisidium</i> sp	Odonata (Damselflies and Dragonflies) Zygoptera (Damselflies) Coenagrionidae (Narrow-winged Damselflies) <i>Coenarion angulatum</i> Walker <i>Coenagrion resolutum</i> (Hagen) <i>Enallagma boreale</i> (Selys) <i>Enallagma cyathigerum</i> (Charpentier) <i>Enallagma ebrium</i> (Hagen) <i>Nehalennia irene</i> (Hagen) Lestidae (Spread-winged Damselflies) <i>Lestes disjunctus</i> Selys Anisoptera (Dragonflies) Aeshnidae (Darners Dragonflies) <i>Aeshna interrupta</i> Walker

Anax junius (Drury)
 Libellulidae (Skimmer Dragonflies)
Sympetrum internum Montgomery
Hemiptera (True bugs)
 Corixidae (Water boatman)
Callicorixa audeni Hungerford
Cenocorixa bifida (Hungerford)
Cenocorixa dakotensis (Hungerford)
Dasycorixa hybrida (Hungerford)
Dasycorixa rawsoni Hungerford
Sigara bicoloripennis (Walley)
Sigara conocephala (Hungerford)
Sigara decoratella (Hungerford)
Trichocorixa verticalis interiores Sailer
 Notonectidae (Backswimmers)
Notonecta kirbyi Hungerford
Notonecta undulata Say

Trichoptera (Caddisflies)

Leptoceridae
Mystacides interjecta Banks
Oecetis avara (Banks)
 Limnephilidae
Anabolia bimaculata (Walker)
Limnephilus cf extractus (Walker)
 Molannidae
Molanna flavicornis Banks
 Phryganeidae
Agrypnia pagetana Curtis
Agrypnia straminea Hagen

Coleoptera (Beetles)

Dytiscidae (Predaceous Diving Beetles)
Acilius sp
Agabus sp
Dytiscus alaskanus Balfour-Browne
Graphoderus perplexus Sharp
Hydroporus sp
Hygrotus sp 1
Hygrotus punctilineatus (Fall)
Hygrotus unguicularus (Crotch)
Ilybius descendens Sharp
Laccophilus biguttatus Kirby
Rhantus sericans Sharp
 Gyrinidae (Whirligig Beetles)
Gyrinus confinis LeConte
Gyrinus maculiventris LeConte
Gyrinus pectoralis LeConte
 Haliplidae (Crawling Water Beetles)
Halipus apicalis Thomson
Halipus canadensis Wallis
Halipus immaculicollis Harris
Halipus longulus LeConte?
Halipus stagninus Leech
Peltodytes tortulosus Roberts
 Hydrophilidae (Water Scavenger Beetles)
Berosus striatus (Say)?
Berosus fraternus LeConte?
Enochrus diffusus (LeConte)
Enochrus hamiltoni (Horn)
Helophorus sp

Page 3

Helophorus orientalis Motschulsky
Hydrobius fuscipes (Linnaeus)
Hydrochara obtusata (Say)

Diptera (Two-winged flies)

Ceratopogonidae (Biting midges)
 Ceratopogonidae sp
 Chironomidae (Non-biting midges)
 Tanypodinae
Ablabesmyia illinoensis (Malloch)
Derotanypus alaskensis (Malloch)
Procladius bellus Loew
Procladius freemani Sublette?
Tanytus punctipennis Meigen
 Orthoclaadiinae
Corynoneura scutellata Winnertz
Cricotopus sylvestris gr.
Cricotopus intersectus (Staeger)
 Chironominae: Chironomini
Chironomus decorus Johannsen
Chironomus tentans Fabricus
Cryptochironomus digitatus (Malloch)
Dicrotendipes sp01
Dicrotendipes sp02
Glyptotendipes barbipes Staeger?
Glyptotendipes lobiferus (Say)
Glyptotendipes paripes (Edwards)
Polypedilum halterale (Coquillett)
 Chironominae: Tanytarsini

Cladotanytarsus mancus group
Micropsectra sp
Paratanytarsus natvigi (Goetghebeur)?
Paratanytarsus penicillatus group
Tanytarsus sp01
Tanytarsus sp02
Tanytarsus cf mendax Kieffer
 Culicidae (Mosquitoes)
Aedes sp
 Dolichopodidae (Long-legged Flies)
Dolichopus sp 01
Dolichopus sp 02
 Ephyridae (Shore Flies)
Ephyridae sp
 Psychodidae (Moth Flies)
Psychodidae sp
 Stratiomyidae (Soldier Flies)
Odontomyia sp
 Syrphidae (Hover Flies)
Helophilus sp?
 Tabanidae (Deerflies and Horseflies)
Chrysops aestuans Wulp
Hybomitra frontalis (Walker)?
Hybomitra illota (Osten Sacken)
Hybomitra cf pediontis (McAlpine)
 Tipulidae (Crane Flies)
Pinocera -sp?
Tipula sp
Limonia sp

agricultural practices, on the aquatic environment.²³ A great deal of research has been initiated to investigate the effects of agricultural chemicals on “duck food”, i.e. macroinvertebrates, in smaller lakes and ponds.^{1,8,16,22} However, results of such “duck food” directed research have provided little detailed information on the biodiversity and biology of macroinvertebrates in these habitats. This often makes it difficult to interpret research results, suggesting more research should be directed to understanding the natural variation and community functioning of these water bodies.¹⁶ It is therefore important to document the macroinvertebrate biodiversity of these habitats to provide baseline information for future investigations and to develop sound management practices.

Future collecting at Meadow Bank Lake will probably yield additional taxa to the list of macroinvertebrates already collected. More collecting is also likely to improve the identifications of many of the specimens that are presently known only as immatures or adult females and cannot, as such, be fully identified to species with certainty. Other collecting methods, such as light traps, emergence traps, activity traps, and the use of quantitative samplers (dredges) and per cent taxonomic composition samples would undoubtedly add new taxa for the lake and would provide information regarding macroinvertebrate community structure in the lake. However, these sampling methods were beyond the funding and scope of the present project.

Acknowledgments

Funding for this research was provided by a grant to Nature Saskatchewan from SaskEnergy. J. Halpin assisted in making field collections and provided preliminary sample processing.

1. BATZER, D.P. and S.A. WISSINGER. 1996. Ecology of insect communities in nontidal wetlands. *Annual Review of Entomology* 41:75-100.
2. BOUSQUET, Y., (Ed.) 1991. Checklist of Beetles of Canada and Alaska. Research Branch Agriculture Canada. Bulletin No. 1861/E.
3. BROOKS, A.R. and L.A. KELTON. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera). *Memoirs of the Entomological Society of Canada* 51:1-92.
4. CARTER, J.W., B.V. MILLET, T.GILMANOV, R.A. VOLDSETH, G.R. GUNTENSPERGEN, and D.E. NAUGLE. 2005. Vulnerability of northern prairie wetlands to climate change. *Bioscience* 55: 863-872
5. CLARKE, A.H. 1981. The Freshwater Mollusks of Canada. National Museum of Canada. Ottawa.
6. COX, R. JR., M.A. HANSON, C.C. ROY, N.H. JR. EULISS, D.H. JOHNSON, and M. G. BUTLER. 1998. Mallard duckling growth and survival in relation to aquatic invertebrates. *Journal of Wildlife Management* 62:124-133.
7. DAVIES, R.W. 1973. The geographic distribution of freshwater Hirudinoidea in Canada. *Canadian Journal of Zoology* 51:531-545.
8. DONALD, D.B., J. SYRGIANNIS, F. HUNTER and G. WEISS. 1999. Agricultural pesticides threaten the ecological integrity of northern prairie wetlands. *The Science of the Total Environment* 231:173-181
9. EULISS, N.H. JR., D.A. WRUBLESKI, and D.M. MUSHET. 1999. Chapter 21: Wetlands of the Prairie Pothole Region, Invertebrate Species Composition, Ecology, and Management. In: Batzer, D.P, R.B. Rader and S.A. Wissinger. (eds.) *Invertebrates in Freshwater Wetlands of North America: Ecology and Management*. John Wiley and Sons, Inc. New York. p. 471-514.
10. HUEL, D. 2000. Managing Saskatchewan Wetlands: A Landowner's Guide. Saskatchewan Wetland Conservation Corporation. Regina, SK.
11. IGNATIUK, J. and D. DUNCAN. 1995. Wetland loss in aspen parkland of Saskatchewan. *Blue Jay* 53: 129-133.
12. MALLORY, M.L., P.J. BLANCER, P.J. WEATHERHEAD, and D.K. McNICOL. Presence or absence of fish as a cue to macroinvertebrate abundance in boreal wetlands. *Hydrobiologia* 1994: 279-280: 345-351.
13. MASON, P.G., D.W. PARKER and P. MORRILL. 1991. An amateur naturalist's guide to

non-biting midges in Saskatchewan. *Blue Jay* 49:174-182.

14. MATTHEWS, J.H., 2004. Report on Common Green Darner (*Anax junius*) emergence in Caledon, Ontario, during 2003. *Ontario Odonata* 5: 12-14.

15. MERRITT, R.W. and K.W. CUMMINS. (Ed.). 1996. An Introduction to the Aquatic Insects of North America. 3rd Ed. Kendall Hunt Publishing Company. Dubque, IA.

16. MORRILL, P.K. and B.R. NEAL. 1989. Impact of deltamethrin insecticide on Chironomidae (Diptera) of prairie ponds. *Canadian Journal of Zoology* 68:289-296.

17. NAUGLE, D.E., R.R. JOHNSON, M.E. ESTEY and K. HIGGINS. 2000. A landscape approach to conserving wetland bird habitat in the prairie pothole region of eastern South Dakota. *Wetlands* 20: 588-604.

18. NEEDHAM, J.G., M.J. JR. WESTFALL and M.L. MAY. 2000. Dragonflies of North America. Revised Edition. Scientific Publishers, Gainesville.

19. PARKER, D.W., 1992. Emergence Phenologies and Patterns of Aquatic Insects Inhabiting a Prairie Pond. Ph. D. Thesis. University of Saskatchewan, Saskatoon, SK.

20. PESCHKEN, D.P. 2003. Wilderness preserved: Nature Saskatchewan's Sanctuaries. *Blue Jay* 61:68-81.

21. RESH, V.H. and D.M. ROSENBERG. (Ed.) 1984. The Ecology of Aquatic Insects. Praeger Scientific, New York.

22. ROHR, J. and CRUMRIN, P.W. 2005. Effects of an herbicide and an insecticide on pond community structure and processes. *Ecological Applications* 15:1135-1147.

23. ROSENBERG, D.M. and V.H. RESH. (Ed.) 1993. Freshwater Biomonitoring and Benthic Macroinvertebrates. Chapman and Hall, New York. NY.

24. SPENCE, J.R. 1981. Experimental analysis of microhabitat selection in water-striders (Heteroptera: Gerridae). *Ecology* 62:1505-1514.

25. SMITH, D.H., 1984. Systematics of Saskatchewan Trichoptera Larvae with Emphasis on Species from Boreal Streams. Ph. D. Thesis. University of Saskatchewan. Saskatoon, SK.

26. THORP, J.H. and A.P. COVICH. 2001. (eds.) Ecology and Classification of North American Freshwater Invertebrates. 2nd Ed. Academic Press, New York, NY.

27. TROTTIER, R. 1971. Effect of temperature on the life-cycle of *Anax junius* (Odonata: Aeshnidae) in Canada. *Canadian Entomologist*. 103: 1671-1683.

28. TROTTIER, R. 1966. The emergence and sex ratio of *Anax junius* Drury (Odonata: Aeshnidae) in Canada. *The Canadian Entomologist* 98:794-798.

29. VENTURELLI, P.A. and W.M. TONN. 2005. Invertivory by northern pike (*Esox lucius*) structures communities of littoral macroinvertebrates in small boreal lakes. *Journal of the North American Benthological Society* 24: 904-918.

30. WALKER, E.M. 1958. The Odonata of Canada and Alaska. Vol. 2. Part III: The Anisoptera-Four families. University of Toronto Press, Toronto, Ontario.

31. WEBB, J.M. 2002. The Mayflies of Saskatchewan. M. Sc. Thesis. University of Saskatchewan, Saskatoon, SK.

32. WESTFALL, M.J. and M.L. MAY. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

33. WHITED, D., S. GALATOWITSCH, J.R. TESTER, K. SCHIK, R. LEHTINEN and J. HUSVETH. 2000. The importance of local and regional factors in predicting effective conservation. Planning strategies for wetland bird communities in agricultural and urban landscapes. *Landscape and Urban Planning* 49:49-65

34. ZIMMER, K.D., M.A. HANSON, M.G. BUTLER and W.G. DUFFY. 2001. Size distribution of aquatic invertebrates in two prairie wetlands, with and without fish, with implications for community production. *Freshwater Biology* 46: 1373-1386.



“Chimney swifts have clawed feet for perching inside hollow trees and masonry chimneys, but they cannot walk. Neither can most humming-birds, which must take off and land to move even an inch or two”

Scott Weidensaul, *The Birder's Miscellany*, p.12

NOTES AND LETTERS

FIRST RECORD OF A TRICOLORED HERON FOR SASKATCHEWAN

On 23 July, 1996 we conducted a survey of colonial nesting water birds east of the Last Mountain Lake National Wildlife Area headquarters and north of the viewing tower (see map on page 69) to determine the location and size of a suspected Black-crowned Night-Heron colony. The day's weather was sunny, with little wind.

We used an airboat for the survey. The boat, though rather noisy, is maneuverable and can turn quickly in any direction as well as move slowly when the engine is throttled low. The observers sit approximately 2m above the water level, affording excellent elevated views of the surrounding marsh and water. We carried 8X and 10X binoculars and field guides.

As we moved toward the suspected heron nesting area, we saw several night-herons standing in the vegetation, with more flying overhead. The birds did not seem startled, several circling and returning to the bulrush stand. Then Taylor saw a medium-sized, greyish bird spring from the matted bulrush, less than 5m from the airboat off the left bow. The first impression was of a heron-like bird similar in size to the nearby night-herons but lacking any black on the upper parts of the body or head. As the bird rose into the air, in front of and then beside the airboat, the bird's head and neck were outstretched and its legs dangled conspicuously below the body. It had a very long slender neck and head, long pointed beak, long legs and large wings with rounded tips. The body was slender, making the wings appear even larger. This slenderness was very striking when compared to the stocky night-

herons flying nearby, and this was evident from the moment the bird first took to the air. The bird's wing span was similar to that of the night-herons.

The wings appeared to be an even grey colour above, with no pattern that might be caused by a difference between the primaries and the rest of the upper wing. The bird's upper body and breast were grey, similar to the wings. The head and neck were also grey and no pattern was seen on either. The impression of the uniformly coloured plumage of this bird was in sharp contrast to the boldly patterned night-herons nearby. As the bird rose above the observers, Taylor saw extensive clear white feathering on the heron's under parts – belly and vent area. White under-wings were not noted. We followed the bird's progress upward and away from the site.

The bird continued to fly with its neck outstretched at first, then gradually retracted it in towards its body. The 'S' shape posture of the neck was striking for a few moments. We did not hear any calls due to the engine noise of the airboat. The heron continued to fly in a southerly direction at a height of 75-100 m and was finally lost from sight. The total time of this observation was less than 3 minutes. We concluded from the observed field marks that the bird was a Tricolored Heron. Unfortunately, we did not have time to take a photograph.

There are several species of medium-sized heron that might be confused with the Tricolored Heron. The Green Heron is smaller, darker and lacks the white underparts. The Little Blue Heron and the Reddish Egret are

most similar in size to the Tricolored, but both lack the diagnostic white underparts of the Tricolored Heron. While in flight, the Tricolored Heron's general shape is reminiscent of the Great Blue Heron, however the latter's much larger size and dark belly plumage separate it from the Tricolored Heron. Taylor is familiar with all of these species and believes this bird had the diagnostic field marks of an adult Tricolored Heron. Dunlop had not seen the species before. To our knowledge, this is the first record of a Tricolored Heron for the province of Saskatchewan.³

The occurrence of Tricolored Heron in Saskatchewan is not unexpected, as the species has a tendency to wander north from the southern United States where it is a common resident of coastal wetlands. In Manitoba it is described as an occasional visitor, with over 16 records dating back to 1924.² For Alberta there are fewer than eight documented records and it is considered an accidental visitor, the first confirmed sighting being 1981.¹

HIGHLIGHTS OF A SOUTHERN SASKATCHEWAN NEST TOUR IN JUNE

On June 9, 2007, Kevin Fitzsimonds took David Miller, Martin Gerard and I out in a jet boat to the Bald Eagle nest on the island where the Red Deer River flows into the South Saskatchewan north of Leader, Saskatchewan. The river was rising fast, dotted with little icebergs of foam and floating debris, but the jet boat made the trip to the island much easier than our first trip by canoe described in the September 2005 issue of *Blue Jay*. For the third year in a row, there are three eaglets in the nest. Since it is rare for Bald Eagles

Acknowledgements

We wish to thank Mark Tataryn who worked as a seasonal biological technician on the National Wildlife Area in 1996 and helped with the inventory of colonial waterbirds. We thank reviewers including R. Dickson for comments.

1. HUDON, J. 2007. The official list of the birds of Alberta. The Royal Alberta Museum, Edmonton, Alberta. [Online]
<http://www.royalalbertamuseum.ca/birds/birdlist/taxon.htm#LCICO>

2. MANITOBA AVIAN RESEARCH COMMITTEE. 2003. The birds of Manitoba. Manitoba Naturalists Society, Winnipeg.

3. SMITH, A. R. 2004. Field Checklist of Saskatchewan Birds. Ninth edition. Nature Saskatchewan, Regina

- Philip S. Taylor and John Dunlop,
Canadian Wildlife Service, Prairie and
Northern Wildlife Research Centre, 115
Perimeter Road, Saskatoon, SK S7K
3E5

to have three young, this is unusual to say the least.

The adults have added more material to the nest, so I couldn't see into most of it, but I did find heron wings and a fish skeleton in the part of the nest I could reach. A good ball player could likely throw a stone into the heron colony from the nest, so maybe that handy supply of protein explains the phenomenal success of this pair. The two adults sat in a nearby tree to watch the proceedings, but David said one of

them made a close flyby while I was at the nest. The day I feel the wind of an eagle is the day I quit banding eaglets; I liked it better when eagles were more shy. Later that day we visited Prairie Falcon eyrie near Lemsford, which is active for at least the fifth consecutive year and this year had four three-week old young. (Figure 1)

On June 10 we visited a number of hawk nests. The Ferruginous Hawks' nest along Hwy 4 near the Leinan Road contained four nestlings, and a nearby nest had a melanistic Ferruginous Hawk with four well advanced young

that should fledge in the next two weeks. Another Ferruginous Hawk nest just a little further on is again successful with three young. There is also a Red-tailed Hawk that roosts very close to the first nest, a pair of Swainson's Hawks soaring nearby, and the nest with three Red-tailed Hawks (Figure 2), just a couple miles north, next to the highway. There are scads of Richardson's Ground Squirrels dead on the road, so there is likely to be adequate food for all.

- Dan Zazelenchuk, Box 39, Kyle, SK
S0L 1T0. E-mail:danzaz@sasktel.net

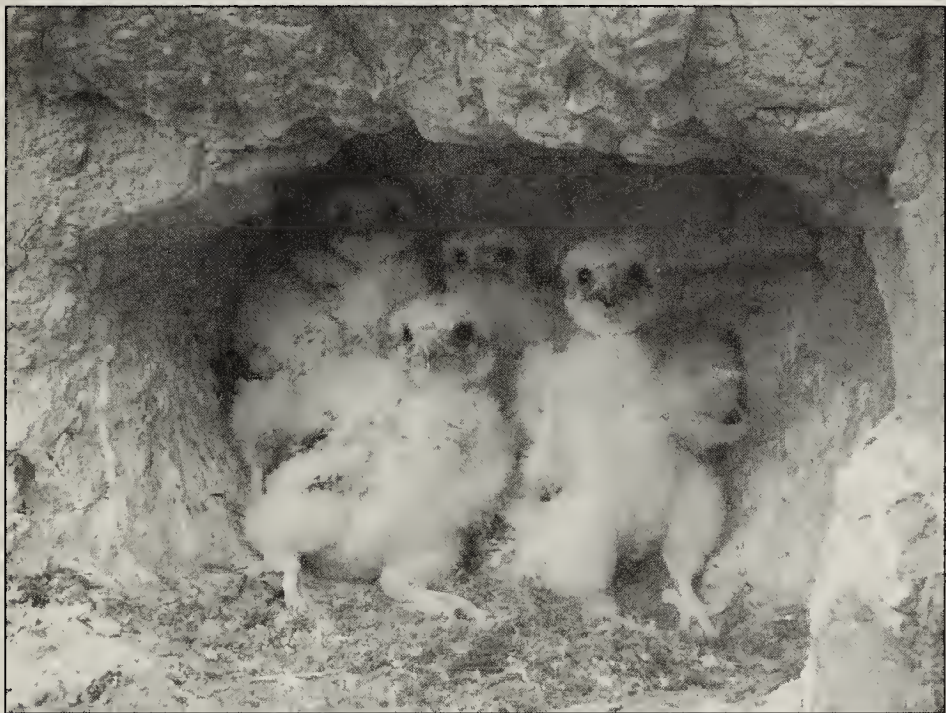


Figure 1. Three week old Prairie Falcons near Lemsford.
D. Zazelenchuk



Figure 2. Richardson's Ground Squirrels in Red-tailed Hawk nest with three young.
D. Zazelenchuk

WHITE-TAILED KITE NEAR MAPLE CREEK, SK



Figure 1. White-tailed Kite in willow

Keith Bell

Around noon on Sept 5, 2006, I was driving west along an unnumbered road south and east of Nekaneet First Nation (approximately 35 kilometers southeast of Maple Creek), when I noticed a bird with a brilliant white front sitting on top of a small, gnarled willow. Through my binoculars I could see large eyes, a slanting black “mask” and yellow cere. Feet bright yellow. Head and back grey; wings darker grey with black markings; a long unbanded tail with contrasting white and dark feathers. I didn’t know what it was but I did know that I had never seen one.

The bird was still there, on the same bush, when I came past in the other direction six hours later, but this time it was plucking prey. And the next day,

when I came back to check for it, this time with Keith Bell, we found it sitting on another willow a few hundred yards away (Figure 1). By now we had checked and eliminated all the likely possibilities and knew that “our bird” was a long way from home: the first White-tailed Kite ever seen in Saskatchewan.

We checked under the bush in which the bird had been plucking prey and found pellets full of what I’d guess was Deer Mouse fur, so perhaps that is what the kite had been catching.

- Candace Savage, 302 Albert Avenue, Saskatoon, SK S7N 1G1. Email: candace.savage@sasktel.net



Figure 2. White-tailed Kite near Maple Creek

Keith Bell

HIGHEST SWAINSON'S HAWK NEST RECORDED IN SASKATCHEWAN

On July 16 2006, I was asked by Stuart Houston to climb a large spruce tree at 812 5th Avenue North in the City Park area of Saskatoon to band Swainson's Hawk nestlings. The nest had been reported by the Ireland family who live nearby.

After struggling up through thick branches, I broke into the open, near the top. There I could have enjoyed the panoramic view high above the city were I not being hit around the ears by the stooping, irate, adult hawk. Three good-sized young were banded under these difficult circumstances. Not surprisingly with such a large and feisty brood, there was no food in the nest. After the young had fledged, we returned with a tape measure and I again climbed the tree to determine the height to the top of the nest. It was 72 feet and 7 inches.

In many trips to band Swainson's Hawks with Stuart Houston, the majority of nests I have seen were in Trembling Aspen trees, with most nests between 15 and 30 feet. In southwestern Saskatchewan where not many trees are available for nest building, low bushes are sometimes used. Extremes of height range from 3 feet in a willow to the nest described in this article. Less than two percent of nests would be over thirty five feet tall. (Stuart Houston, pers. comm.).

Acknowledgements

I would like to thank Martin Gérard, and Stuart and Mary Houston for their help and suggestions in preparing this note.

-André Gérard, 91 Caron Crescent, Grasswood, Saskatoon, SK S7T 1A8



"The fairy tern of the tropical Pacific lays but a single egg, and it does so in the most unlikely of places—on the bare branch of a tree. The egg is balanced perfectly on the bark, undisturbed by the incubating parent." Scott Weidensaul, *The Birder's Miscellany*, p.45

A VISIT TO THE SWAN FAMILY

Photographs by George Tosh



The Tundra Swan pair rest in front of their nest on a small island near Patience Lake potash mine, east of Saskatoon on June 11, 2007. Where are the cygnets?



The six cygnets having emerged from under the parent on the right, head for the water



Then the family crosses to the lee shore of the lake.....



.....to feed.



Harris's Sparrows and White Crowned Sparrows.

Paul Geraghty

POETRY

OVERCAST

Only in the winter
can the cougar be tracked
and be shot
dead in his tracks

But if he manages to elude
the bitter cold
until it melts
from all the warmth
in the air
he will have shown
that it's thunder that strikes
and lightning that bolts
when one's time
is weathered well.

- David Raju

UNEXPECTED FINDS

If I had not walked back that May morning
to look for discarded beer bottles
down in the meadow by the rampant willows
where the teenage boys drive to drink
and philosophize, or cry
I would not have seen how
the damp ground beneath the willows,
not yet grown green with grass
was newly carpeted with fluffy white willow down...
overnight, it seemed, the willow flowers
had shed their cottony crowns
now glowing in the early morning light
an evanescent layer of froth.

- Bob Nero

NATURE

Nature's beauty, all its splendour, moves me still,
seizes and exhilarates with quiet joy—

molded clouds enveloping pellucid skies,
grayed painted stuff, compact, wondrously adrift;
glimpsed hidden lakes, flickering-hued, rippled stitched,
vistaed bays, islands, and azured distances;
humped rocks, squat and granular, now lichen-faced,
solid drifts of sand, abraded slopes, wind-honed;
looming wood-sierras, shadowy and dense,
shaggy wildernesses, hushed, prospect for birds;
silent snows descending, slow slithering whirls,
whiteness pressing downwards, great plains blurred and dim;
treasured tapestries at hand, textured mixes,
patterned browns and coppers, inlaid blues and greens—

nature's beauty, all its splendour, moves me still,
bids, beckons, calls, like far-off curlews crying...

- Victor C. Friesen

GARDEN COMPANION

Sally Sparrow is a cheerful cheeper,
she eats seeds from the Golden Thread Creeper,
she gobbles spiders from the Columbine,
green aphids from the Honeysuckle Vine,
fat white worms from the yellow Twinkle Phlox,
hard beetles from the blue Forget-me-nots.
Sally is happy with such a diet.
I have no present plans to try it.

- Jean MacKenzie

SHADOW OF A MONARCH

Startled by the quick flickering shadow
before me on the bright lawn
I looked up to find a monarch winging upwards
high above and in between the trees
as sure-winged as any bird
and I thought how they roost in trees
in faraway Mexico.

Minutes later when the butterfly flew down
right beside us, low and hesitant,
even the dog turned his head.

- Bob Nero

NOT GOOD ENOUGH

Feeling happy, dressed in pink,
I walked across the grass.
A hummingbird, attracted,
flew towards me for a drink.
Seeing its mistake, it gave me no caress,
veered to a real flower, leaving me – JILTED.

- Jean MacKenzie



*Real estate is 'deer' for this
American Robin at the back of
Dennis Fisher's garage in
Saskatoon. Dennis Fisher*

MARSHES: THE DISAPPEARING EDENS

WILLIAM BURT. 2007. Yale University press, New Haven. ISBN 978-0-300-12229-9. Hard cover. 90 color photographs. 22 x 26 cm. xii + 180 pp. \$35.00 U.S.

In this sumptuous book, beautifully written, we follow Bill Burt on a pilgrimage to discover hidden treasures within marshes across North America. En route, we get his pungent commentary concerning what humankind has almost totally destroyed. Marshes, the most heavily impacted habitats on our continent, continue to diminish.

We learn about marshes across the United States. Native Phragmites, Common Reed, has spread out across the wetlands at the mouth of the Connecticut River, "snuffing out the rightful plants and ousting native birds, acre after acre." The salt marshes of Elliott Island along the east coast of Chesapeake Bay remain home to the enigmatic little Black Rail. The five miles of open salt marshes at Great Bay, near Tuckerton, New Jersey, is still an enchanted place, although only a two-hour drive from New York City. The man-made, square ponds in Sacramento Refuge are the forlorn remnants of the four million acres of wetlands formerly present in the Central Valley of California. At the Lower Klamath Lake Refuge in extreme northern California, there are dikes and open water without their former sedges and cattails; sadly, no tules remain at Tule Lake. In Idaho, Burt takes us on a tour of Camas Refuge, Grays Lake Refuge and, on the Utah border, Bear Lake National Wildlife Refuge. A sign at the Monte Vista Refuge in southern Colorado gives some public recognition of changes wrought by the

human hand: "Spring Creek once flowed about 8,000 gallons of water, creating a wetland haven ... Many wells were drilled ... In the mid-1960s, the spring ceased flowing."

Two chapters deal with marshes in western Canada. The first is Sewell Lake and the adjacent two miles of sedges south of Douglas, Manitoba. Here Burt photographed Yellow Rail and Sora, LeConte's Sparrows, fireflies and lightning, and studied the calls of Sedge Wrens and Nelson's Sharp-tailed Sparrows.

The second Canadian chapter ends the book, finishing with strength. Burt tells us that in June 1905, A. C. Bent, the author/editor of the 23 volumes of *Life Histories of North American Birds*, discovered the marsh mapped as "Lake of the Narrows," a half-mile north of the siding at Sidewood, Saskatchewan on the Canadian Pacific Railway mainline. Bent estimated that there were between 15,000 and 20,000 gull nests in this colony, "one of the most spectacular, most interesting, and most beautiful sights in the realm of North American ornithology." Only six miles to the west, north of Piapot, was Crane Lake. Referred to by Bent as "the gem of all the wonderful bird country," Crane Lake was mainly dry when Earl Godfrey visited in 1948. Burt gives credit to Ducks Unlimited for the restoration of this marsh, achieved with a circular containment dike that holds runoff in an area one quarter the size of the original wetland, now embellished with

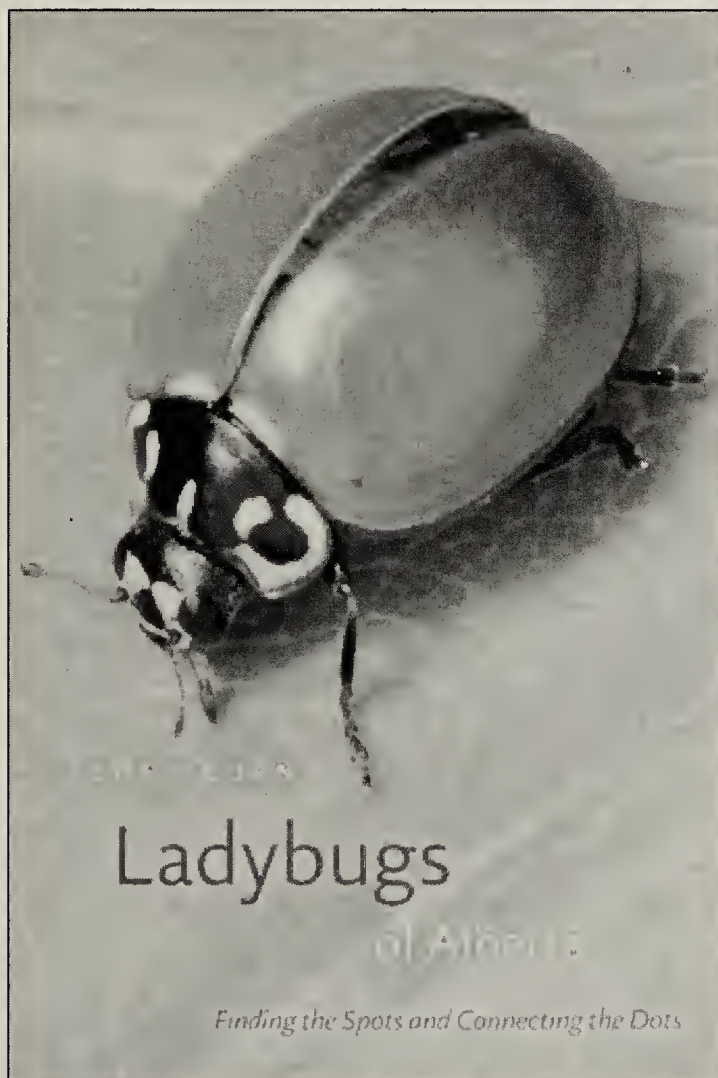
50 earthen nesting islands and five gravel loafing bars. "Among the rushes," Burt notes, are "small pools and labyrinthine corridors, most hidden but betrayed by honks and splashes of cavorting coots, the oinking of eared grebes, and the bubbly courtship quacks of ruddy ducks" – and hundreds of pairs of Franklin's Gulls, "impressive, still." Burt's photographs of the Crane Lake marsh near sunset, and of the Pied-billed, Western and Eared Grebes, each with young, rank with the best anywhere.

This book is not an oversize coffee table book and, considering its quality, the price is about half of what might have been expected. The high quality reproductions were made in Italy. Buy it, read it, admire it, savor it. It would be a perfect gift for any naturalist, any wildlife photographer, anyone who loves our remaining marshes.

- Reviewed by Stuart Houston, 863 University Drive, Saskatoon, SK S7N 0J8. E-mail: stuart.houston@usask.ca

LADYBUGS OF ALBERTA: FINDING THE SPOTS AND CONNECTING THE DOTS

JOHN ACORN. 2007. University of Alberta Press. 169 pages. Soft Cover. 152.5mm x 228.5 mm. 120 colour photographs, 2 black-and-white photographs, 95 colour paintings, 75 maps. ISBN 0-88864-381-0. Cost: \$29.95.



Many naturalists, including myself, have been waiting impatiently for the latest John Acorn book in the Alberta Insect Series, which to date includes books on Tiger Beetles and Damselflies. As an author, John has incredible interpretive ability and his latest book explores an attractive yet poorly covered group – the ladybugs. This book abounds with John's excellent photographs as well as his engaging and entertaining writing style.

This book opens with a gallery of all species covered in the book. This series of paintings of all species known from Alberta, along with much of their variation, is displayed in a layout that lends itself to easy comparisons for quick identification. Following this are six chapters that cover everything from the ladybug basics and natural history, to study

and conservation, and wraps up with the species accounts.

In the introductory chapter, John clearly explains what a ladybug is, including explanations of terminology used. The second chapter, "Life of a Ladybug," is appropriately thorough and investigates many interesting areas such as the common misconception that ladybugs are the "gardener's friends." In the chapter, "Ladybug Study in Alberta," John gives us an appreciation of where our knowledge came from and interesting insights into the pioneers of the study. The fourth chapter, "Introduced Ladybugs and Conservation," is an exceptional piece on introduced species and how the effects on the native fauna can be overblown. He also presents a fresh perspective about how non-native species are demonized that I think all naturalists should read. The remaining two chapters contain the species accounts that cover all seventy-five species recorded in Alberta, including the lesser ladybugs that previously only the most seasoned coleopterists would consider looking at. The inclusion of the latter group is an important part of this well-researched book.

Most species accounts are accompanied by a great photograph, and for each there is a North American range map and a useful pronunciation guide (humourously including the

pronunciation of "sp." [ssPUH]). As with his previous books, he has entertaining rhyming couplets and even explains the origins of the scientific and common names for each species. Species identification is more than just a description in many cases and includes useful identification hints. Finally the notes section expands on a broad range of interesting tidbits and stories to wrap up the species accounts.

The three appendices contain a checklist, glossary, and helpful sources for ladybug study. Finally there is a detailed reference section.

While this book focuses on the Albertan fauna, it will still cover most species encountered in surrounding provinces and states. My only criticisms of this book are minor. In the photo opposite of page one, the antenna is labelled incorrectly as a maxillary palp. Also of minor importance, the ladybug gallery lacks any indication of scale which would be useful for beginners.

Overall this is a book that should be on every naturalist's bookshelf whether or not they consider themselves entomologists. It is a rare example of a book that has the ability to inspire young and old to become "Nature Nuts".

Reviewed by Jason J. Dombroskie,
Dept. of Biological Sciences, CW405,
Bio. Sci. Bldg., University of Alberta,
Edmonton, AB, T6G 2E9. Email:
dombrosk@ualberta.ca



"I am no more lonely than a single mullein or dandelion in a pasture, or a bean leaf, or sorrel, or a horse-fly, or a bumblebee. I am no more lonely than the Mill Brook, or a weathercock, or the north star, or the south wind, or an April shower, or a January thaw, or the first spider in a new house."

- Henry David Thoreau

MYSTERY PHOTO

JUNE 2007 MYSTERY PHOTO

The creature shown in Figure 1 is about 4 mm long and was found on a crane fly (an example of a crane fly is shown in Figure 2). What is the creature and what was it doing on the crane fly?



Figure 1. Robert Bercha © 2007.



Figure 2. Robert Bercha, © 2005

ANSWER TO THE MARCH 2007 MYSTERY PHOTO

The mystery bird shown in the March issue is a Bald Eagle. The Bald Eagle was photographed on a slough in the National Wildlife Area south of Last Mountain Regional Park on 1 September 2005. According to Al Smith, who took the photograph, “It dove into the slough (presumably after something), then sat like a goose on the water for perhaps a minute. I was thinking I would have to go rescue it, but then it got up and flew away without difficulty.”



Blue Jay, founded in 1942 by Isabel M. Priestly, is a journal of natural history and conservation for Saskatchewan and adjacent regions. It is published quarterly by **Nature Saskatchewan, 206-1860 Lorne Street, Regina, Saskatchewan S4P 2L7.**

CN ISSN 0006-5099

Editors: Anna and Ted Leighton, 328 Saskatchewan Crescent West, Saskatoon, SK S7M 0A4, Canada. E-mail : leighton@sasktel.net

Associate Editors : Mark Bringham, Marlene Evans, Vernon Harms, Ronald Hooper, Stuart Houston, Josef Schmutz, Carol Scott.

Proofreader: Nancy Allan

EDITORIAL INFORMATION: *Blue Jay* welcomes all submissions, hand-written or typed, polished or in need of editorial assistance. All items for publication should be addressed to the editors. Deadlines for text for each issue are two months prior to issue, i.e. 1 January, 1 April, 1 July and 1 October. Deadlines for photographs are one month later. Please include the author's telephone number or E-mail address for editorial contact. Hand-written or typed manuscripts should be submitted in duplicate. Manuscripts can also be submitted in electronic form, either on a 3.5" diskette or by E-mail in WordPerfect, Microsoft Word, Rich Text Format (rtf) or ASCII text. Send images separately. For further information, see "Guidelines for Authors" *Blue Jay*, Vol. 62 (3). R. W. Nero and J. R. Duncan abstract *Blue Jay* for *Recent Ornithological Literature*. *Blue Jay* is abstracted by BIOSIS.

Common names are used for birds, mammals, butterflies, reptiles and amphibians. Bird names follow the Checklist of North American Birds by the American Ornithologists' Union (7th edition, 1998); mammal names, Mammal Species of the World by Wilson and Reeder; butterfly names, The Butterflies of Canada by Layberry *et al*; and names of reptiles and amphibians follow Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico by Committee on Standard English and Scientific Names, Brian I. Crother, chair (2001). For other groups, both scientific and common names are included.

Photographs may be submitted as prints, slides or digital images. For the best quality reproduction on paper, high resolution (600 DPI) images are required, preferably in TIF format. JPG files and images with a lower resolution are also acceptable and provide sufficient quality in many cases. Digital images can be sent by e-mail directly to the editors, or if the files are very large, they should be put on a CD and mailed to the editors' postal address.

Although Nature Saskatchewan will make every effort to return your slides and prints to you, we recommend that you make a copy in case your items get lost in the mail. We encourage submission of photographic material with articles and welcome colour photos for *Blue Jay* covers.

Any material printed in *Blue Jay* may be reprinted for non-commercial purposes, without permission, but credit lines are both appreciated and good etiquette. Use of photographs and poetry requires permission from the photographer/author.

REPRINTS: a maximum of five reprints is available to authors free of charge for each article. Authors wishing to receive reprints should send their request, along with a stamped (\$.98) self-addressed, 5 3/4 x 9 1/2 in. kraft envelope to the Nature Saskatchewan office as soon as they receive notice that their article is accepted for publication.

SUBSCRIPTIONS: Subscription to *Blue Jay* is one of the benefits of membership in Nature Saskatchewan. A membership application form is included on the last page of each issue. Send all renewals, new memberships, donations and changes of address to Nature Saskatchewan (address at top).

Bulk subscription orders (minimum of five to one address) are available to society members and educational institutions at the rate of \$15 (Can.) for the first subscription and \$13 for each additional one. Outside Canada, fees are \$18 (Can.). We do not collect GST on memberships or subscriptions.

Printed by Impact Printers, Regina, SK on 50% recycled paper.

THIS ORGANIZATION RECEIVES FUNDING FROM



NATURE SASKATCHEWAN



206-1860 Lorne Street, REGINA, SASKATCHEWAN S4P 2L7
PHONE: (306) 780-9273 or
TOLL FREE 800-667-4668 in Saskatchewan only
FAX: (306) 780-9263
E-MAIL: info@naturesask.ca
WEB: www.naturesask.ca

BOARD OF DIRECTORS

FOR MORE INFORMATION PLEASE CONTACT OUR OFFICE:

Honorary President	Doug Schmeiser
Past-president	Attila Chanady
President	Bill MacKenzie
Vice-president	Bernie Ryma
Secretary	Claire Sanders
Treasurer	Bob MacFarlane
Administration Director	Mary Aird
Conservation Director	Lorne Scott
Education Director	Branimir Gjetvaj
Research Director	Robert Warnock
Member-at-Large	Jacqueline Bolton
Member-at-Large	Yvonne Cuttle
Member-at-Large	Jared Clarke
Member-at-Large	Fraser Hunter
Member-at-Large	Luc Delanoy

OFFICE CONTACTS

General Manager and Natural Heritage Programs Manager	Margaret Skeel
Member Services and Outreach Programs Manager	Paul Wilson
Administration Assistant	Cheryl Parker
Habitat Stewardship Manager (Rare Plant Rescue)	Tara Sample
Habitat Stewardship Coordinator (Operation Burrowing Owl)	Andrea Kotylak
Habitat Stewardship Coordinator (Shrubs for Shrikes)	Michelle Yaskowich

PROGRAM CONTACTS

Important Bird Areas Community Planner	Joe Schmutz
Last Mountain Bird Observatory	Alan Smith
Living by Water Facilitator	Dennis Lawson
Nature Quest	Paul Wilson
Piping Plover Guardian Coordinator	Katherine Jacobson
Saskatchewan Plant Watch Coordinator	Deanna Trowsdale-Mutafov
Vulture Tracking	Stuart Houston

CONTACTS FOR LOCAL SOCIETIES & AFFILIATES

Fort Qu'Appelle Natural History Society	Ron Hooper
Indian Head Natural History Society	David Gehl
Kelsey Ecological Society	David Weiman
Nature Moose Jaw	Russ McKnight
Nature Prince Albert	Carman Dodge
Nature Regina	Dale Hjertaas
Saskatoon Nature Society	Donna Bruce
Southwest Naturalists	Gerald Handley
Weyburn Nature Society	Val Thomas (Sec.)
Yellowhead Flyway Birding Trail Association	Rob Wilson (Sec.)
Yorkton Natural History Society	Geoff Rushowick





Nature
SASKATCHEWAN

(PUBLICATION AGREEMENT #40063014
RETURN UNDELIVERABLE COPIES TO
ADMIN CENTRE PRINTING SERVICES
111-2001 CORNWALL STREET
REGINA SK S4P 3X9

U OF A LIBRARY
BIBLIOGRAPHIC SERVICES 11/10
5TH FLOOR CAMERON -xx9990(H)
EDMONTON AB T6G 2J8